

REPAIR MANUAL

POLAROID LAND CAMERA

MODEL 360

REVISION I — SEPTEMBER 1970

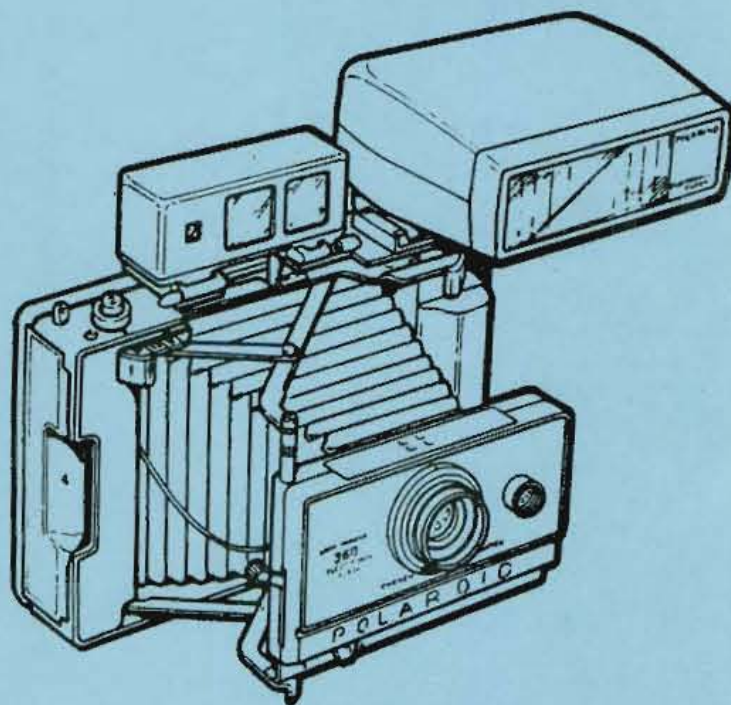


TABLE OF CONTENTS

Title	Page
INTRODUCTION	
SECTION 1 - PRINCIPLES OF OPERATION	1
A. Battery Charger	1
B. Model 385 Automatic Shutter	2
1. Shutter Operation without the Electronic Flash	2
2. Shutter Operation with the Electronic Flash	3
3. Flash Pictures with Non-Flash Timing	4
C. Electronic Timer	4
D. Electronic Flash	6
1. Electrical Action	6
2. Mechanical Action	6
E. Wiring Diagrams	7
SECTION 2 - SYSTEM CHECKOUT	11
A. Checking the Battery Charger using the 360 Analyzer	11
B. Checking the Battery Charger using the 360 Meter Connector Block	12
C. Charging the Flash Battery	12
D. Checking the Shutter Battery and Interlock Switch	12
E. Checking Shutter Speeds	13
Model D Tester	13
Model C Tester	13
F. Checking the Electronic Timer	13
1. Checking Timer Battery Voltage	14
2. Checking Timer Battery Drain	14
3. Checking the Timing	14
G. Checking the Electronic Flash and Camera with the 360 Analyzer	14
H. Checking the Electronic Flash and Camera with the 360 Meter Connector Block	15
SECTION 3 - PROBLEM ANALYSIS	17
A. Safety	17
B. Special Procedures	17
1. Checking the Flash Battery Cells under Load	17
2. Checking the Trigger Coil and the Trigger Circuit	18
3. Checking the Operation of the Flash Circuit	19
4. Checking Converter Input Voltage	19
5. Testing Electronic Components	19
C. Battery Charger	20
Problem Analysis Chart - Battery Charger	21
D. Model 385 Automatic Shutter	22
Problem Analysis Chart - Model 385 Automatic Shutter	27
E. Electronic Timer	29
Problem Analysis Chart - Electronic Timer	30
F. Electronic Flash	30
Problem Analysis Chart - Electronic Flash	32
SECTION 4 - REPAIR AND ADJUSTMENT PROCEDURES	37
A. Battery Charger	37
Replacing the Charger Lamp	37
B. Model 385 Automatic Shutter	37
Replacement of the Base Block and Electronic Mounting Board Assembly	37
C. Electronic Timer System	38
1. Replacing the Electronic Timer	38
2. Timer Switch Continuity Check, Adjustment and Replacement	40
3. Electronic Timer Transducer and Lamp Replacement	41
4. Measuring Timer Battery Drain	42

TABLE OF CONTENTS (Cont'd.)

Title	Page
D. Electronic Flash System	43
1. Replacing the Converter Circuit Board	43
2. Adjusting the Converter Circuit	44
3. Testing the Electronic Flash Dump Switch	46
4. Flash Louver Actuator Replacement and Adjustment of the Louvers	46
5. Flash Modification	46
6. Installation of Insulators on Flash Connectors	48
E. Miscellaneous Camera Repairs	50
1. Adjusting the Battery Interlock Switch	50
2. Replacing the Battery Compartment	50
3. Replacing the Battery Cradle	51
SECTION 5 - PARTS IDENTIFICATION	55
Pictorial Index & Common Hardware	56
Shutter Assembly	58
Body/Bellows Assembly	60
Body/Bellows Assembly (Cont'd.)	62
Rear Door & Rear Cover Assembly	64
Electronic Flash Assembly	66
Fast Charger Assembly	68
Front Cover Assembly	69
Model 385 Shutter	70
Numerical Parts / Price List	73

WARNING

The Model 360 Polaroid Land Camera system presents repair personnel with dangerous voltages. Before any camera repairs are attempted, read the safety statement which appears at the beginning of Section 3. Be thoroughly familiar with all safety requirements before disassembling any part of the camera, electronic flash or battery charger.

EXERCISE EXTREME CAUTION WHEN WORKING ON THE MODEL 360 SYSTEM

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

INTRODUCTION

This revised manual should provide repair personnel with all the information needed to repair the Model 360 camera. The manual is primarily devoted to those areas where the Model 360 differs from earlier pack cameras. Accordingly, the emphasis is on the new Model 385 automatic shutter, the electronic flash, electronic timer, and the battery charger. (To gain a thorough understanding of the Model 385 automatic shutter, it is suggested that reference be made to the "Repair Manual on Automatic Shutters" published in May, 1968.)

This manual is divided into five sections:

Section I contains the principles of operation for the battery charger, the automatic shutter, the electronic timer, and the electronic flash. Also included in the section are wiring diagrams which should be consulted when electrical repairs are made.

Section II describes the procedure to be employed in checking the Model 360 system, including camera, flash, and charger. A new piece of test equipment, the 360 analyzer, has been built to help perform this checkout.

Section III contains detailed assembly checkout procedures which cannot be done with the 360 analyzer. Also included in this section is a group of troubleshooting charts which prescribe solutions for isolated faults.

Section IV presents detailed instructions for the disassembly and reassembly of Model 360 components. Included in this section are adjustments for the electronic timer, converter circuit, and flash louvers.

Section V is the parts identification section, containing parts lists and exploded view drawings.

When a Model 360 camera is brought in for repair, a visual inspection of the entire system (camera, flash, and charger) should first be made. Next, the three assemblies should be subjected to the system checkout described in Section II. If the fault is still not isolated, perform the tests in Section III. (Be thoroughly familiar with the safety precautions listed in Section III before opening any of the 360 assemblies.) After the fault is isolated, refer to Section IV for the method of repairing the defective part.

The material which has been revised or added since the first printing of this manual is identified by the bar which appears in the left-hand margin.

SECTION 1 - PRINCIPLES OF OPERATION

A. BATTERY CHARGER

Figure 1-1 presents the electrical schematic for the battery charger used in the model 360 system. Actual current paths through the various components are shown in Figure 1-2. With the battery charger plugged into an electrical outlet, 110 vac is brought to a combination step-up/step-down transformer. The 110 vac is converted to 360 vdc and to 3 vdc. The higher voltage "forms" capacitor C5 in the electronic flash while the lower voltage is used to charge the nickel cadmium flash battery.

As the flash becomes fully charged, the rise in terminal voltage is sensed by the transistor circuit which turns off the silicon controlled rectifier (SCR) thus ending the high charging rate. The battery continues to trickle charge through the $\frac{1}{2}$ watt resistor shown in parallel to the SCR in the schematic.

The lamp connected to the transformer primary is lit as long as the batteries charge at the high current rate. When the SCR shuts off the high current, the lamp goes out, giving an indication that the flash battery is fully charged.

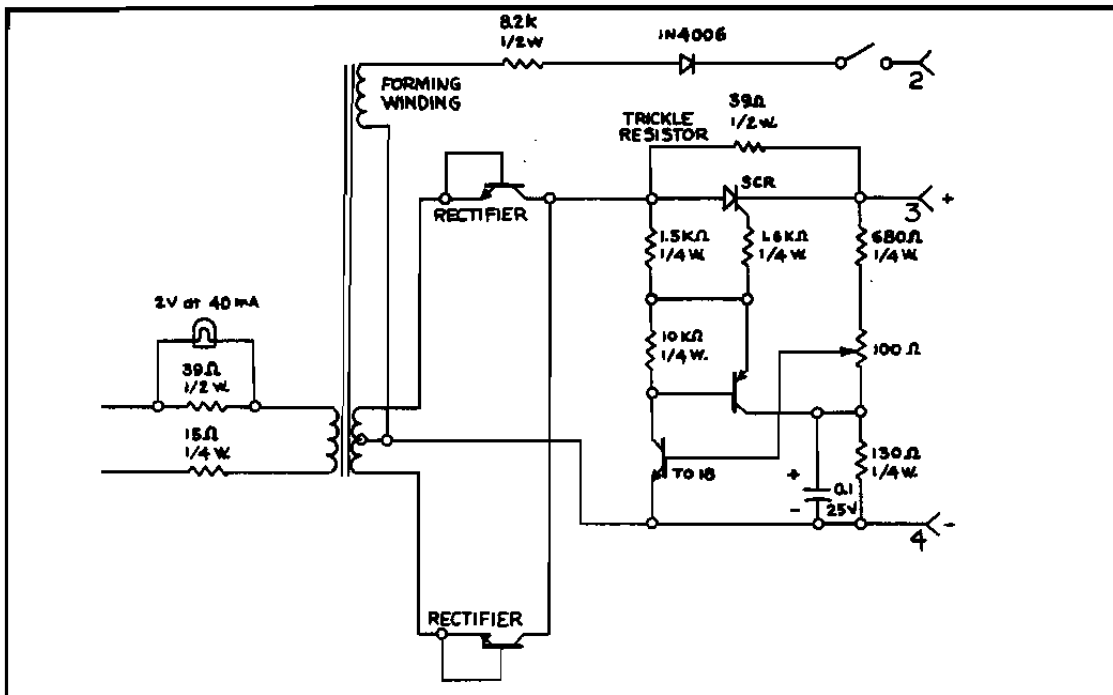


FIG. 1-1 BATTERY CHARGER SCHEMATIC

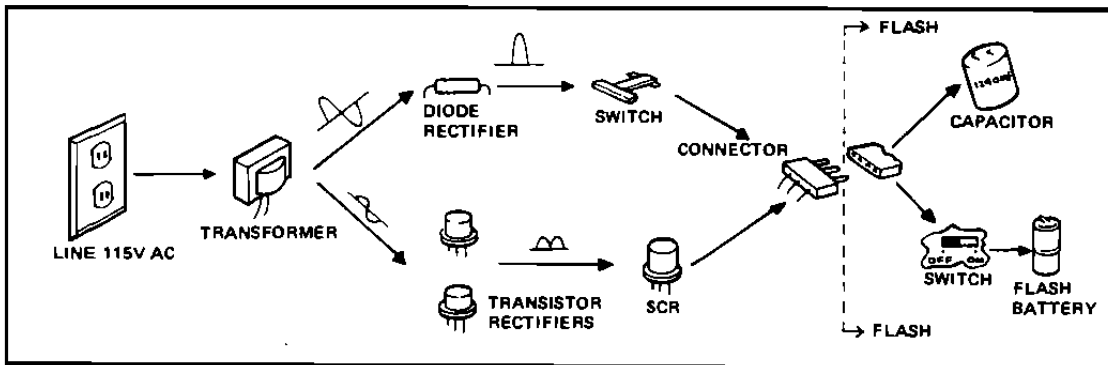


FIG. 1-2 CURRENT FLOW THROUGH THE CHARGER CIRCUIT

B. MODEL 385 AUTOMATIC SHUTTER

The model 385 automatic shutter, which is used in the model 360 camera, may be considered a more sophisticated version of the model 362 shutter which was used in 100 and 200 line cameras. The new shutter has several features designed to accommodate the electronic flash. Other changes which differentiate it from the model 362 shutter can be considered as product improvements. In general, the differences between the new model 385 shutter and the earlier model 362 shutter can be grouped as follows:

- The model 385 shutter uses miniaturized electronics in the form of an integrated circuit. The integrated circuit contains transistor/resistor logic, (replacing several discrete components) for the triggering function.
- The shutter circuitry has been altered to accommodate the electronic flash.
- The flashgun plug has been eliminated.
- The potentiometers have been removed from the circuit.
- The X-break switch, one timing capacitor, and a capacitor contact on the aperture wheel have been eliminated.
- Power for the shutter is provided from a 3 volt battery rather than a 4.5 volt battery.
- The model 385 shutter has a four conductor shutter wire in comparison to the two conductor wires of earlier models.

1. Shutter Operation without the Electronic Flash

Like earlier automatic shutters, the model 385 shutter uses a photoconductive cell to control exposure time. Coupled with the photocell is an

integrated circuit which regulates the triggering function. The integrated circuit replaces transistors and resistors found in earlier shutters.

Operation of the shutter without the electronic flash is described below by briefly explaining what happens when the release button is pressed. This explanation of shutter interactions is of a general nature. For a more detailed description of mechanical and electrical actions (which are common to all automatic shutters) consult the "Repair Manual on Automatic Shutters" published in May, 1968.

Before electrical action can start, the shutter must be cocked so that the keeper on the closing blade is set firmly against the electromagnet and the S-2 timing switch is closed. Pressing the release knob closes battery switch S-1, completing the circuit from the positive to the negative side of the battery. Current then flows through the various legs of the circuit. Figure 1-3 shows the circuit in schematic form, while Figure 1-4 portrays the manner in which current flows through the various components.

In the holding leg of the circuit, current flows from the positive side of the 3-volt battery, through the interlock, to pin 1 of the integrated circuit (IC). (Refer to Figure 1-5.) This causes the output of the IC (pin 2) to turn on. With the output on, current flows through the magnet coil and pins 2 and 3 to the negative side of the battery. With the electromagnet energized in this manner, the second shutter blade will remain open until the circuit is broken.

Simultaneously, current in the timing leg flows from the positive side of the 3-volt battery, through the interlock, the photocell, R2, and S2 to the negative side of the battery. However, S2

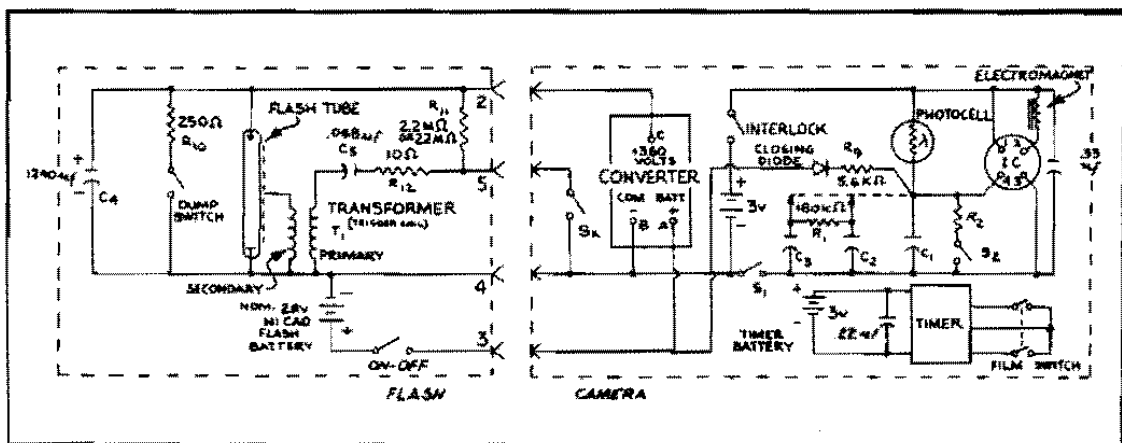


FIG. 1-3 MODEL 385 SHUTTER SCHEMATIC

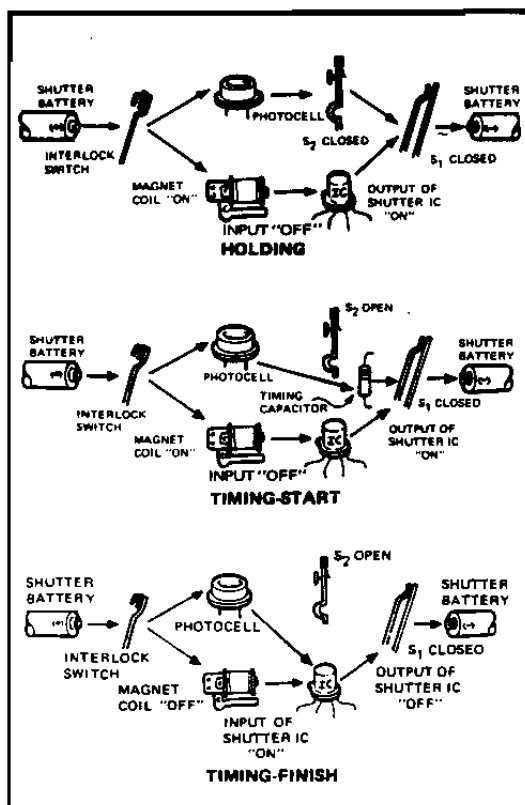


FIG. 1-4 CURRENT FLOW THROUGH THE SHUTTER CIRCUIT(WITHOUT FLASH)

opens practically coincident with the closing of S1 by the mechanical action illustrated in Figure 1-6. The roller, riding on the cocking slide, rides over the blade latch forcing it down. This opens S2,

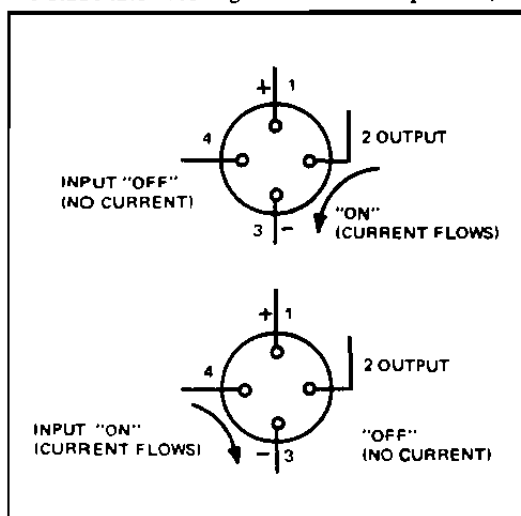


FIG. 1-5 SHUTTER IC OPERATION

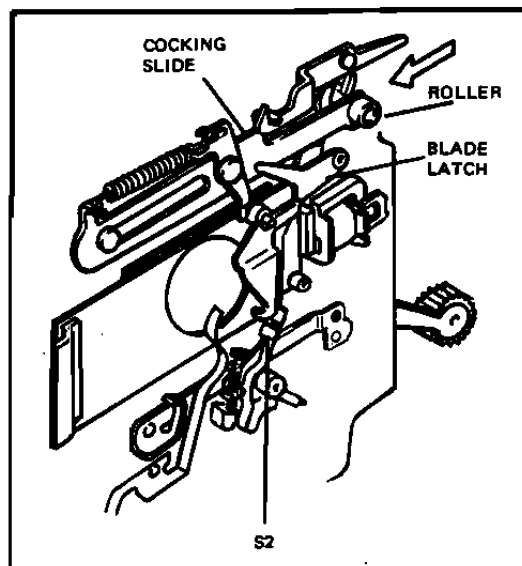


FIG. 1-6 SHUTTER MECHANISM

breaking the circuit. Current is then diverted to the timing capacitors which charge at a rate determined by the resistance of the photocell. When the capacitors become fully charged, the current then flows into pin 4 of the IC. When the voltage reaches a certain point, the input side of the IC is turned on resulting in the output side turning off. This then breaks the holding circuit and de-energizes the electromagnet. The second shutter blade is released and the exposure is completed.

When the shutter button is released, S1 opens again and current from the battery is completely cut off. Recocking the shutter closes S2 again and allows the timing capacitors to fully discharge.

2. Shutter Operation with the Electronic Flash

As is the case without the flash, before electrical action can start, the shutter must be cocked so that the keeper on the closing blade is set firmly against the electromagnet and the S2 timing switch is closed. Pressing the release knob closes battery switch S1, completing the circuit from the positive to the negative side of the battery. Current then flows through the various legs of the circuit. Refer again to Figure 1-3 for the schematic of the circuit. Figure 1-7 shows current flow through the components.

In the holding leg of the circuit, current flows from the positive side of the 3-volt battery, through the interlock, to pin 1 of the integrated circuit (IC). (Refer to Figure 1-5). This causes the output of the IC (pin 2) to turn on. With the output on, current flows through the magnet coil and pins 2 and 3 to the negative side of the bat-

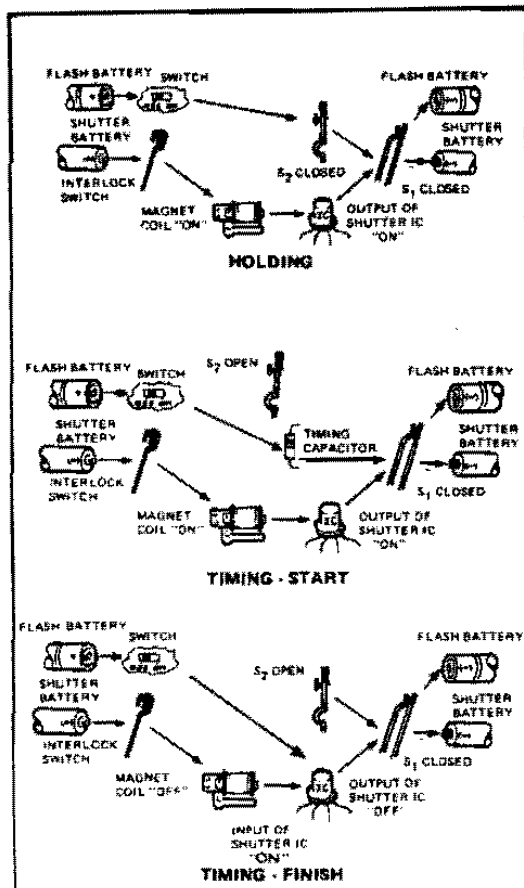


FIG. 1-7 CURRENT FLOW THROUGH THE SHUTTER CIRCUIT (WITH FLASH)

tery. With the electromagnet energized in this manner, the second shutter blade will remain open until the circuit is broken.

Simultaneously, current in the timing leg flows from the positive side of the 3-volt battery, through the interlock, the photocell, R2 and S2 to the negative side of the battery. However, S2 opens practically coincident with the closing of S1 by the mechanical action illustrated in Figure 1-6. The roller, riding on the cocking slide, rides over the blade latch forcing it down. This opens S2, breaking the circuit. Current is then diverted to the timing capacitors.

With the electronic flash on the camera (and the flash ON-OFF switch turned ON), current from the 2.4 volt flash battery is introduced into the shutter timing circuit. This current flows from the positive terminal of the battery, through the closing diode and resistor R9, into the timing capacitors. Because the resistance of R9 is less than the resistance of the photocell, current from the 2.4 volt battery charges the timing capacitors

much more quickly than current from the other battery could. Therefore, shutter timing with the flash is almost independent of the photocell.

When the capacitors become fully charged, the current then flows into pin 4 of the IC. After the voltage reaches a certain point, the input side of the IC is turned on resulting in the output side turning off. This then breaks the holding circuit and de-energizes the electromagnet. The second shutter blade is released and the exposure is completed.

When the shutter button is released, S1 opens again and current from the battery is completely cut off. Recocking the shutter closes S2 and allows the timing capacitors to fully discharge.

3. Flash Pictures with Non-Flash Timing

To take pictures where there is a great contrast of light, the flash may be used together with non-flash camera timing. To do this, the flash ON-OFF switch is set to OFF after the flash is fully charged. This breaks the circuit from the 2.4 volt battery to the timing capacitors and the camera must then rely on the 3 volt shutter battery to provide current for the timing function. The flash will go off because the shutter's Sx contact closes as usual, but the photocell will not be bypassed by the current from the 2.4 volt battery. Shutter timing will be determined solely by the resistance of the photocell as it is affected by scene light.

Removing the flash from the camera closes the dump switch. Any charge remaining in the flash capacitor is "dumped" through this switch and is dissipated in resistor R10. This prevents the flash from holding a charge when it is off the camera.

C. ELECTRONIC TIMER

The electronic timer measures elapsed time in frames of 15 seconds to 120 seconds. It does this by measuring the time required to charge an 82 microfarad capacitor. Figure 1-8 is a simplified schematic representation of the circuit. Figure 1-9 shows current flow through the various components.

Operation of the timer starts with the setting of a dial on the camera back (Figure 1-10) which is directly connected to the one megohm potentiometer shown in the schematic. (The potentiometer, in turn, is connected to the 82 microfarad capacitor.) Changing the dial setting alters the value (or resistance) of the potentiometer. For example, if the dial were set to 15, it would take 15 seconds for current passing through the potentiometer to charge the 82 microfarad capacitor.

The timing cycle is initiated by the removal of the exposed picture (pulling the yellow tab) from the camera. This momentarily closes a two-pole, normally open switch and completes the timing circuit,

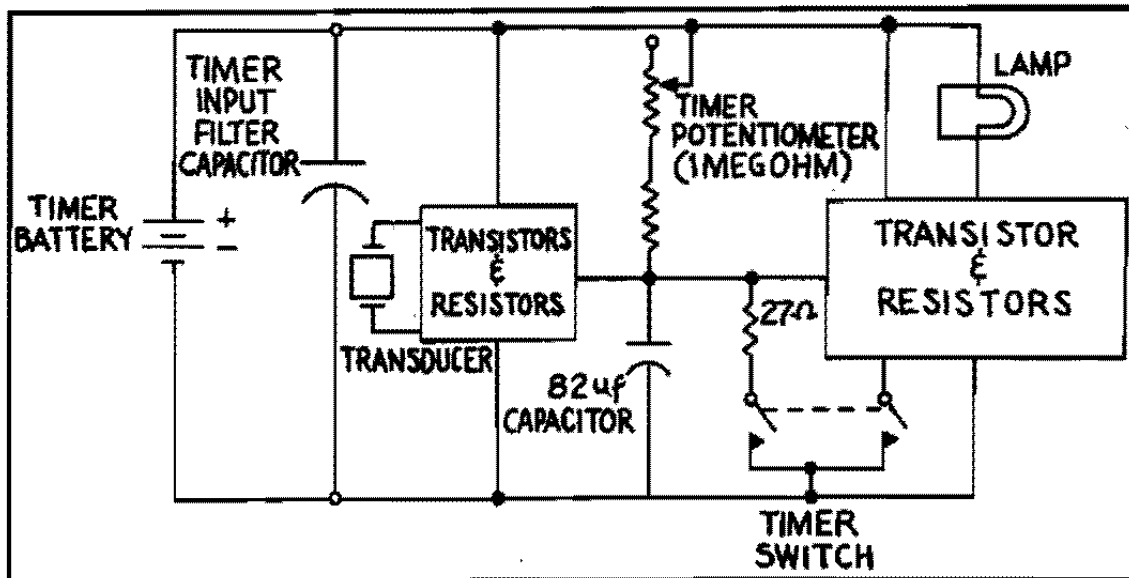


FIG. 1-8 ELECTRONIC TIMER SIMPLIFIED SCHEMATIC

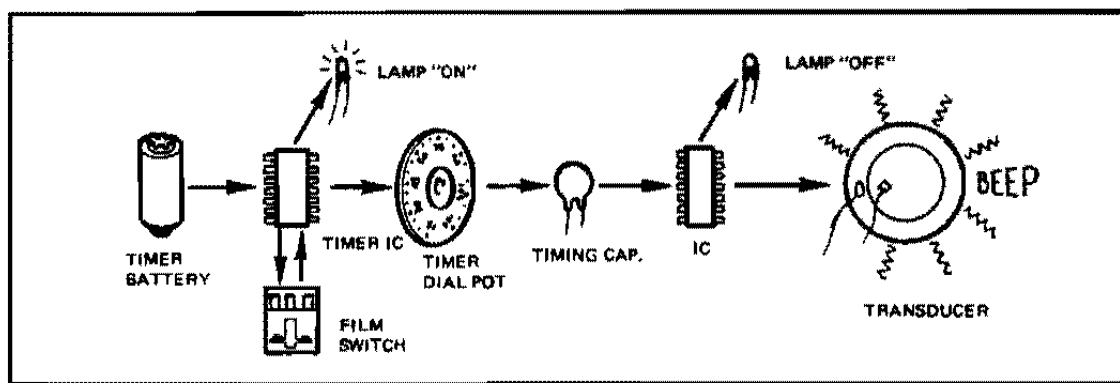


FIG. 1-9 CURRENT FLOW THROUGH THE TIMER CIRCUIT

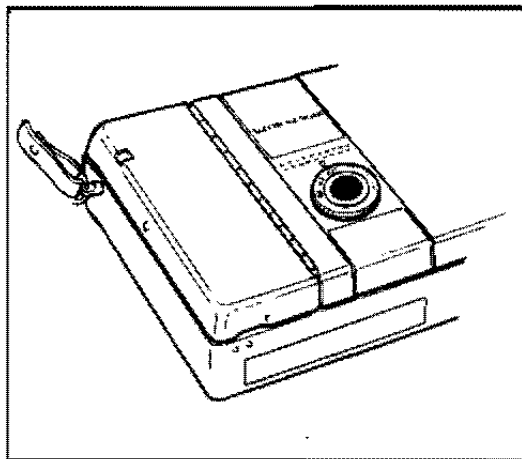


FIG. 1-10 ELECTRONIC TIMER DIAL

The closing of one pole allows the capacitor to fully discharge through the 27 ohm resistor, insuring that it has no residual voltage from a previous timing cycle. The closing of the second pole turns the IC transistor/resistor circuit on and lights the lamp. When the switch opens, the 82 microfarad capacitor begins charging again. While the capacitor is charging, the lamp remains illuminated. Once the capacitor has fully charged, a difference in potential in the other IC transistor/resistor circuit excites the transducer which emits a high frequency "beep." At the same time, the lamp goes out. The high frequency "beep" coupled with the extinguishing of the lamp indicates that the timing cycle has been completed.

D. ELECTRONIC FLASH

In the earlier shutters, firing of the flash is achieved by having two contacts (Ss and Sx) close at the same time. A flash switch inserts two resistors into the timing circuit to compensate for an incorrect photocell reading caused by the sudden brightness of the flashbulb. These resistors increase the length of time needed to charge the timing capacitors to regulate the closing of the shutter and take advantage of the full light output of the bulb. The flash circuit is broken by the release of the closing blade of the shutter which opens one of the flash contacts (Ss).

The use of the electronic flash with the model 360 camera radically changes this sequence. The following discussion explains how the flash is fired.

1. Electrical Action

As the electronic flash is plugged onto the foot assembly of the camera, the dump switch is opened. (Refer again to Figure 1-3 and also see Figure 1-11) Turning the ON-OFF switch at the back of the flash to the ON position initiates the following action:

Current flows through the ON-OFF switch from the positive side of the 2.4 vdc battery to the converter. The converter boosts the 2.4 vdc to approximately 360 pulsating dc which charges capacitor C4 and also appears across the contacts of the flash tube.

As C4 is charging, current through the output of the converter illuminates a lamp in the camera body. The lamp remains lit as long as C4 is charging. When C4 is fully charged, the current through the output of the converter is cut off and the lamp goes out. Thereafter, the lamp will flash in conjunction with the surges of current which keep the capacitor fully charged. In addition to the visual

reminder of charging provided by the lamp, the converter emits a high-frequency tone while C4 is being charged.

When the shutter is cocked, switch contact Sx opens. This action charges capacitor C5 to about 360 vdc. C5 will stay charged only as long as the shutter is cocked and the Sx contact is open. Once the shutter is tripped, the Sx contact closes. This discharges C5 through the primary of the transformer (the "trigger coil") and by transformer action, the current in the primary induces a secondary voltage of about 5000 volts across the ignition ("trigger") winding. This ionizes the gas in the flash tube allowing C4 to discharge through the tube, producing the brilliant flash.

2. Mechanical Action

The amount of light produced by the electronic flash can be mechanically regulated by opening or closing the louvers in the flash assembly. The linkage used to control louver movement is shown first in Figure 1-12.

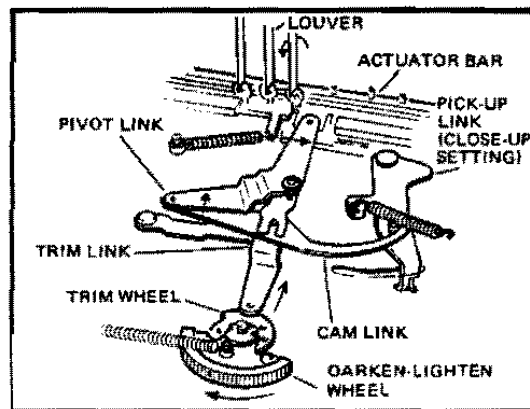


FIG. 1-12 FLASH LINKAGE AT CLOSEUP SETTING

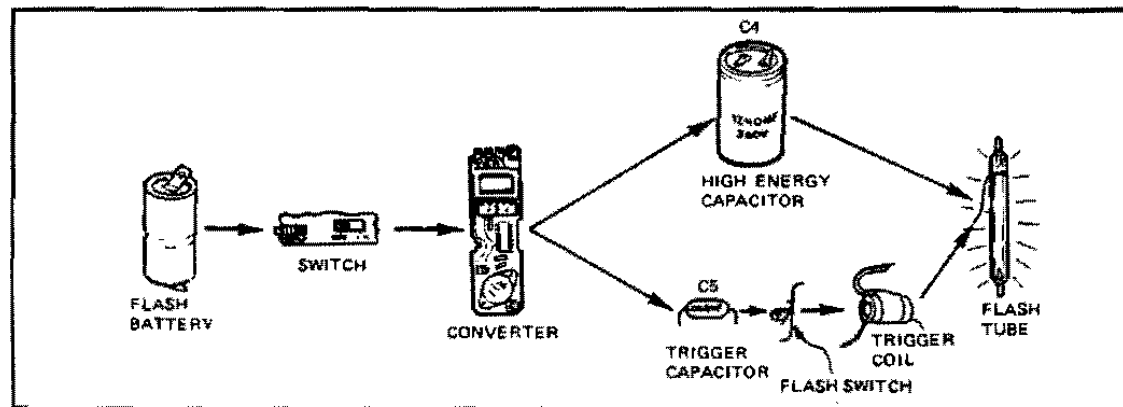


FIG. 1-11 CURRENT FLOW THROUGH THE FLASH CIRCUIT

The louvers can be moved in two ways. The first is by turning the "Darken-Lighten" wheel at the back of the flash head and the second is by simply focusing the camera.

Turning the wheel toward "Darken" results in a movement of the linkage as indicated by the arrows in Figure 1-12. The trim link follows the rise on the trim wheel. This forces the cam link back and pivots one end of the link around a post on the pickup link. The other end deflects the pivot link and results in the sliding of the actuator bar to the right, closing the louvers. Turning the wheel toward "Lighten" reverses this action and opens the louvers.

The foregoing description of linkage action presupposes that the focus bar is set at the close-up position as shown in Figure 1-12. However, as the focus bar is moved toward the infinity setting, the relationship of the cam link to the pickup link changes (Figure 1-13). The cam link will follow the post on the pickup link for about half of its length of travel. Starting at that point, the post moves away from the cam link and the louvers are moved to the wide open position. With the cam link deprived of its pivot point, the louvers cannot be adjusted by the "Lighten-Darken" wheel.

E. WIRING DIAGRAMS

Figure 1-14 is a wiring diagram showing the wiring connections between the automatic shutter, the converter circuit, and the connector for the electronic flash. The electronic timer wiring diagram is presented in Figure 1-15, while Figure 1-16 shows the electronic flash wiring diagram.

These diagrams should be consulted whenever electrical repairs are undertaken.

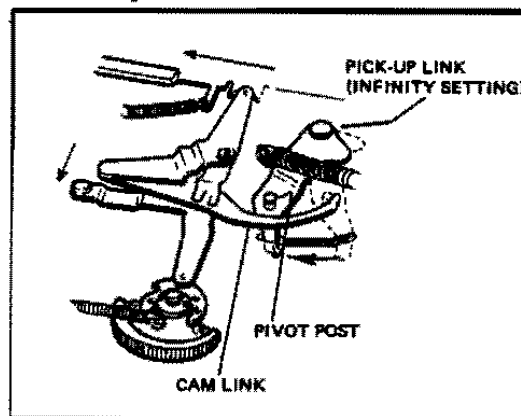


FIG. 1-13 FLASH LINKAGE AT INFINITY SETTING

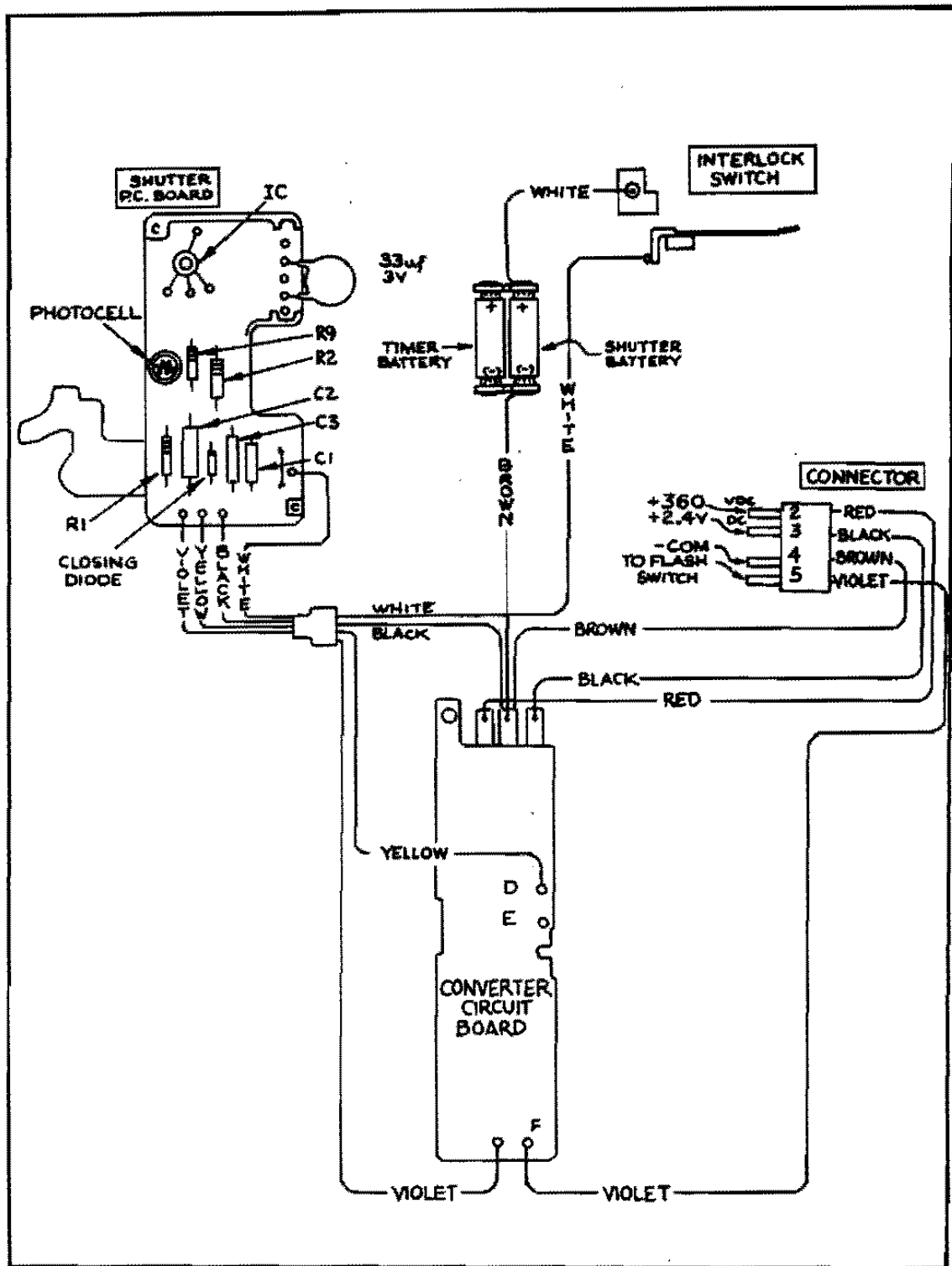


FIG. 1-14 SHUTTER AND CONVERTER WIRING DIAGRAM

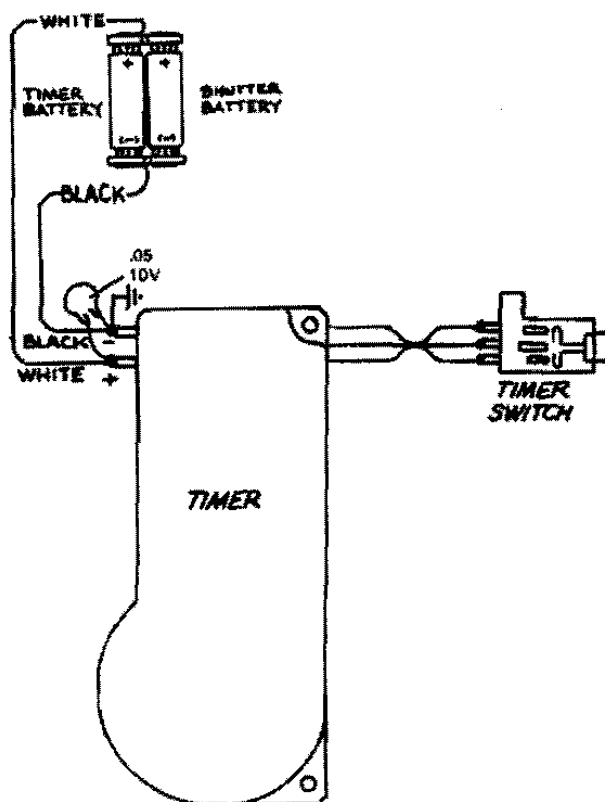


FIG. 1-15 ELECTRONIC TIMER WIRING DIAGRAM

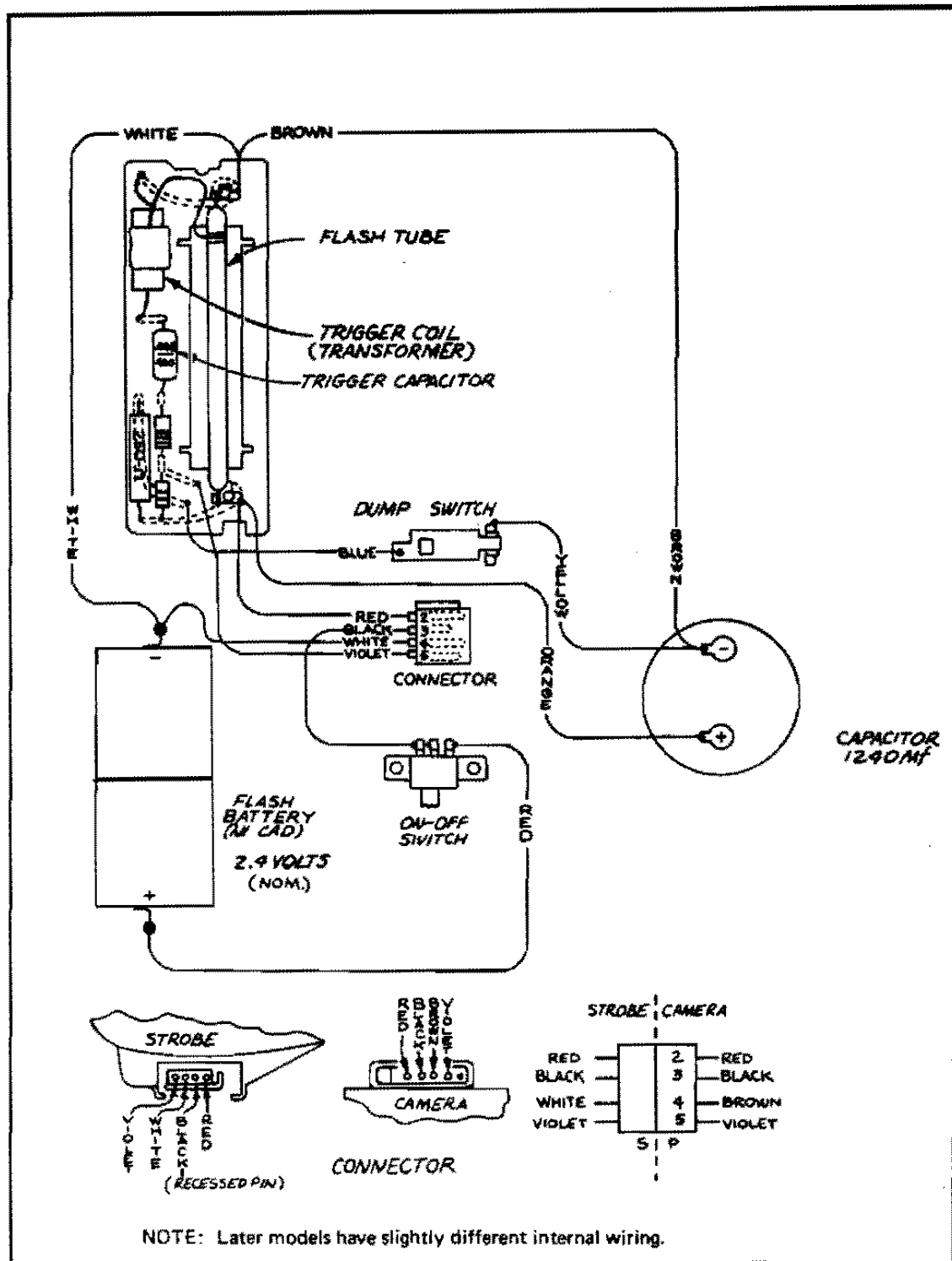


FIG. 1-16 ELECTRONIC FLASH WIRING DIAGRAM

SECTION 2 - SYSTEM CHECKOUT

This section of the manual contains a checkout procedure which is designed to isolate problems in the Model 360 system. Two pieces of test equipment are referred to in the procedure. The first is the 360 Analyzer, a sophisticated piece of test equipment which measures camera, flash and charger outputs. The second is the 360 Meter Connector Block which, when coupled with a VOM, is also capable of measuring system outputs. Perform the applicable steps in this section depending on which piece of test equipment you have. (If you have the 360 Analyzer, there is no need to perform those steps which utilize the connector block. Conversely, if you have the 360 Meter Connector Block, do not perform those steps calling for the use of the analyzer.)

A. CHECKING THE BATTERY CHARGER USING THE 360 ANALYZER

Check out the battery charger on the 360 analyzer as follows (Figure 2-1):

1. Set the selector switch on the analyzer to "Charger".
2. Set the ON/OFF switch of the electronic flash to "On" and clip the flash onto the male connector of the analyzer. The "BATTERY" meter should rise to about 2.5 volts.
3. Hold down the "BATTERY DISCHARGE" switch on the analyzer for a minute or two. This drains the flash battery and insures that the charger will operate at the fast charge level for the following steps.
4. Plug the battery charger into a 110 vac outlet and then attach the test plug on the analyzer to the charger. The meters should read as follows:
 - a. The "INPUT CURRENT" meter should indicate at least 0.80 amps (while the fast charge light in the charger is on).
 - b. The "CAPACITOR" meter should rise slowly. The voltage shall not exceed 340 volts.
5. If the meters do not indicate as specified, refer to the Problem Analysis section of this manual.
6. Unplug the charger and the flash from the analyzer.

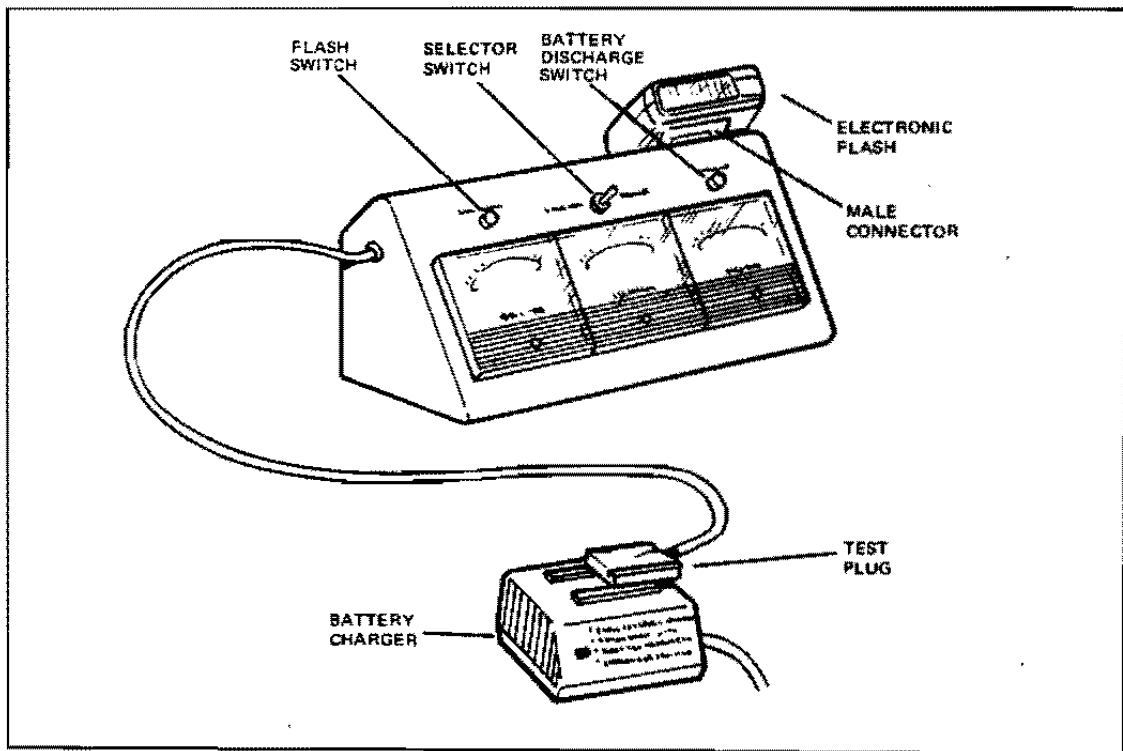


FIG. 2-1 ANALYZER SETUP FOR THE BATTERY CHARGER

B. CHECKING THE BATTERY CHARGER USING THE 360 METER CONNECTOR BLOCK (FIGURE 2-2).

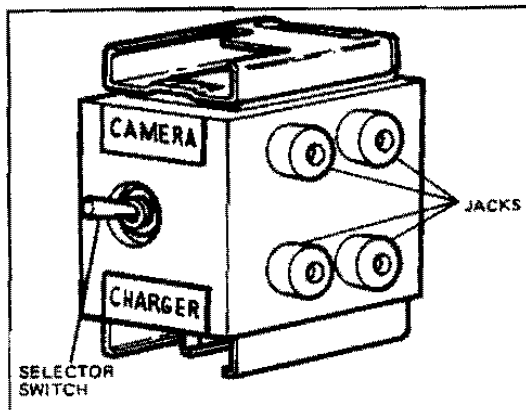


FIG. 2-2 360 METER CONNECTOR BLOCK

NOTE: This test should be done with an electronic flash which has depleted batteries in need of a charge.

1. Connect the electronic flash (with the flash in the "OFF" position) to the 360 Meter Connector Block and then slide the block onto the battery charger. (See Figure 2-3).

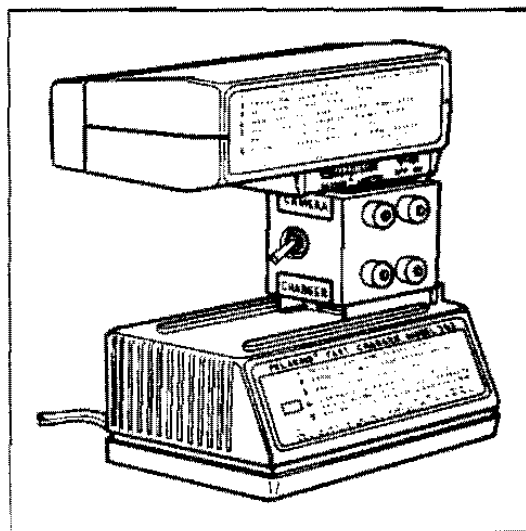


FIG. 2-3 TEST SETUP

2. Set the selector switch on the block to "Charger". Plug the charger into a 110-vac outlet.
3. Set a VOM on a scale that will indicate 1-amp DC or higher. Insert the positive probe into the bottom green jack and the negative probe

into the top green jack.

4. Turn the flash switch to the "ON" position and observe the meter. The reading must be at least 0.80 amp.
5. If the reading is not as specified, refer to the Problem Analysis section of this manual. (Problem Analysis Chart for Battery Charger.)
6. Disconnect the probes from the jacks and turn the flash switch "OFF".
7. Set the selector switch on the block to "Camera".
8. Set the VOM on a scale that will indicate 400 VDC or higher. Insert the positive probe into the red jack and the negative probe into the black jack.
9. Turn the flash switch to the "ON" position and observe the meter. The voltage must be positive and must not exceed 340 volts. (It may take the charger a long time to charge the capacitor, (thus reaching 340 volts) so this test should be made near the end of a charging cycle.
10. If the reading is not as specified, refer to the Problem Analysis section of the manual. (Problem Analysis chart for the Battery Charger).
11. Disconnect the charger and electronic flash from the 360 Meter Connector Block.

C. CHARGING THE FLASH BATTERY

1. Connect the charger to a 110 vac outlet.
2. Slide the electronic flash (with the switch in the "ON" position) firmly onto the battery charger. Be sure the flash and the charger connectors are firmly engaged.
3. If the charger light comes on (indicating fast charging has begun), record the time. The light should not remain on for more than 120 minutes. If it does, there is either a defective flash battery or a malfunctioning battery charger. The flash battery or the entire charger must be replaced.

D. CHECKING THE SHUTTER BATTERY AND INTERLOCK SWITCH

While the electronic flash is being charged, perform the following shutter checks:

1. Check the voltage of the shutter battery. Using the camera repair battery tester (27 ohm load), it must be 2.6 volts minimum. Using a volt meter, it must be 2.75 volts minimum when the shutter magnet coil is used as a load.

2. Extend the camera bellows and cock the shutter. (Be sure that the shutter battery is properly installed in the battery nest.) Cover the photocell with your finger and trip the shutter. If both blades close together, the interlock switch is probably not operating properly. It can be repaired according to the instructions in Section IV of this manual.

E. CHECKING SHUTTER SPEEDS

Check shutter speeds using either the Model D or Model C Tester. When performing these tests, record all readings. Also record the settings of the light level selector and the scene selector. If any of the readings differ from those specified below, consult Section III of this manual (Problem Analysis).

Model D Tester

1. 75/50 DULL

- a. Set the aperture wheel to 75 and the scene selector to "Bright Sun or Dull Day also Flash." Cock the shutter and place the camera onto the exposure tester. Swing it into position for testing.
- b. Set the selector switch on the tester to 101 and the light level wheel to 150/50. Set the Colorpack II switch to "NORMAL".
- c. Depress the footswitch and trip the shutter. The reading on the F-stop meter should be between +0.2 and -0.4.

2. 75/50 BRIGHT

- a. Set the scene selector on the camera to "Bright Sun Only" and cock the shutter.
- b. Depress the footswitch and trip the shutter. The reading on the F-stop meter should be between +0.2 and -0.4 relative to the reading obtained in step 1c above.

3. 75/800 BRIGHT

- a. Set the light level to "150/800" and cock the shutter.
- b. Depress the footswitch and trip the shutter. The reading on the F-stop meter should be between +0.6 and 0.0 relative to the reading obtained in step 2b above.

4. 75/800 DULL

- a. Set the scene selector to "Bright Sun or Dull Day also Flash" and cock the shutter.
- b. Depress the footswitch and trip the shutter. The reading on the F-stop meter should be between +0.4 and -0.4 relative to the reading obtained in step 3b above.

ing obtained in step 3b above.

5. 3000 DULL

- a. Set the aperture wheel to 3000 and the scene selector to "Bright Sun or Dull Day also Flash." Cock the shutter.
- b. Set the light level wheel to "3000 INDOORS."
- c. Depress the footswitch and trip the shutter. The reading on the F-stop meter should be between +0.5 and -0.4 relative to the reading obtained in step 1c above.

Model C Tester

1. 75/50 DULL

- a. Set the aperture wheel to 75 and the scene selector to "Bright Sun or Dull Day also Flash." Cock the shutter and place the camera onto the exposure tester. Swing it into position for testing.
- b. Set the lever on the tester to 50 and position the Colorpack II switch to "NORMAL."
- c. Depress the footswitch and trip the shutter. The reading on the F-stop meter should be between +0.2 and -0.4.

2. 75/50 BRIGHT

- a. Set the scene selector on the camera to "Bright Sun Only" and cock the shutter.
- b. Depress the footswitch and trip the shutter. The reading on the F-stop meter should be between +0.2 and -0.4 relative to the reading obtained in step 1c above.

3. 75/800 BRIGHT

- a. Set the lever on the tester to 800 and cock the shutter.
- b. Depress the footswitch and trip the shutter. The reading on the F-stop meter should be between +0.6 and 0.0 relative to the reading obtained in step 2b above.

4. 75/800 DULL

- a. Set the scene selector to "Bright Sun or Dull Day also Flash" and cock the shutter.
- b. Depress the footswitch and trip the shutter. The reading on the F-stop meter should be between +0.4 and -0.4 relative to the reading obtained in step 3b above.

F. CHECKING THE ELECTRONIC TIMER

While the electronic flash is being charged, perform the following electronic timer tests. If the readings are not as specified, consult Section III of this

manual.

1. Checking Timer Battery Voltage

Actuate the timer and place the probes of a volt meter (set at 3 vdc) across the terminals of the timer battery (top battery in the nest). The reading must be at least 2.75 vdc. If measured with a Camera Repair Battery Tester (27 ohm load), the reading must be at least 2.6 vdc.

2. Checking Timer Battery Drain

Disconnect the positive end of the timer battery from its terminal (Figure 2-4). Place one

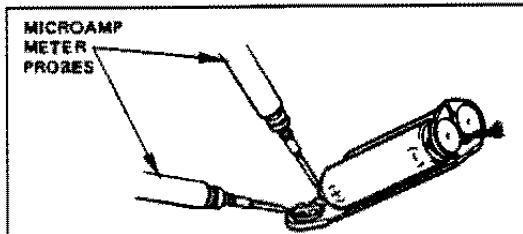


FIG. 2-4 MEASURING TIMER BATTERY DRAIN

probe of a microamp meter on the positive terminal of the battery and the other probe on the terminal receptacle. If the timer has an input filter capacitor (Figure 2-5), the reading must be a maximum of 10 microamps. If it is greater than 10 microamps, consult Sections III and IV.

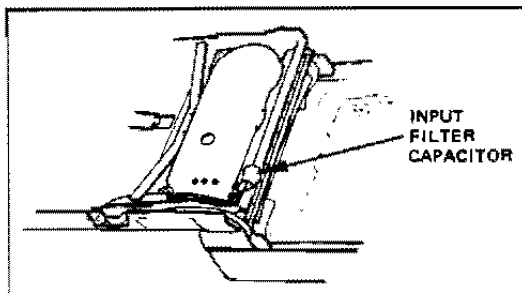


FIG. 2-5 LOCATION OF TIMER INPUT FILTER CAPACITOR

3. Checking the Timing

Set the timer dial to 60 and actuate the timer switch. Measure the time interval. It must be between 58 and 64.5 seconds. Also observe the operation of the light and the transducer.

G. CHECKING THE ELECTRONIC FLASH AND CAMERA WITH THE 360 ANALYZER

When the electronic flash is fully charged, remove it from the battery charger. Inspect the flash and camera connectors for bent pins or for sockets out

of position. Remove the bezel from the flash and open the louvers. Check to see that the flash has been modified (Figure 2-6). If it has not been

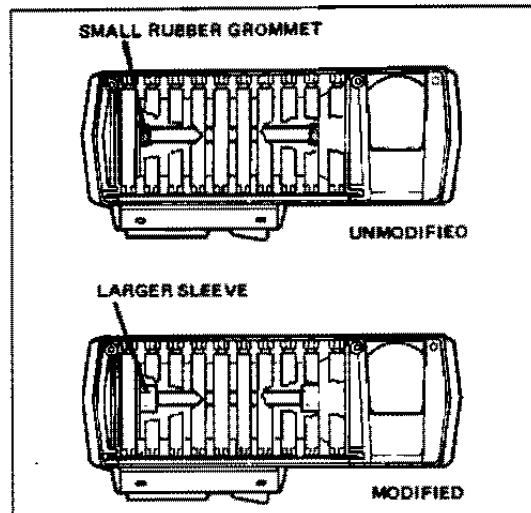


FIG. 2-6 CHECKING FOR MODIFIED FLASH ASSEMBLIES

modified and there has been a "no-flash" or "intermittent flash" complaint, perform the flash modification described in Section IV. If it has been modified, replace the bezel and proceed with the following steps using the 360 analyzer (Figure 2-7).

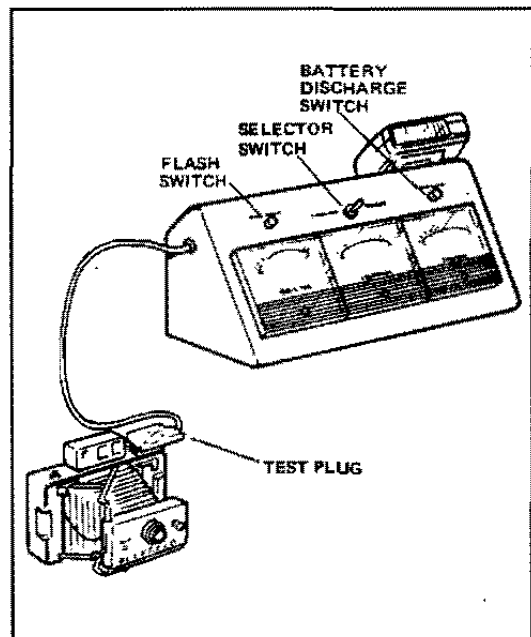


FIG. 2-7 ANALYZER SETUP FOR FLASH AND CAMERA

1. Set the selector switch on the analyzer to "Converter."
2. Set the ON-OFF switch of the electronic flash to "ON" and clip the flash onto the analyzer's foot assembly. The "Battery" meter should rise to approximately 2.5 vdc.
3. Extend the camera bellows and cock the shutter. Clip the test plug on the analyzer onto the camera's foot assembly. Observe the action of the meters on the analyzer **WHILE THE CAPACITOR IS CHARGING**.
 - a. The "Capacitor" meter should slowly rise to between 350 and 365 volts.
 - b. The "Battery" meter should drop back slightly.
4. When the capacitor is **FULLY CHARGED** (the converter light blinking), the meters should read as follows:
 - a. The "Capacitor" meter should drop very slightly while the light is out. When the light comes on and the converter "beeps", the meter reading should rise to the value recorded in step 3a above.
 - b. The "Battery" meter should rise to the value noted in step 2 above. When the light comes on and the converter "beeps", the meter should drop 0.2 or 0.3 volts.
5. Cover the photocell with your finger and trip the shutter of the camera. The flash should fire, and you should hear a distinct second "click" as the second blade closes. If the flash doesn't fire, or if there is no second "click," perform the following steps:
 - a. If the flash fails to fire, press the "Flash" switch on the analyzer. If the flash fires, there is a defect in the camera's flash circuit which must be repaired. If there is still no flash, the flash assembly is defective and must be repaired.
 - b. If the second blade stays open (no second "click") until the photocell is uncovered or until the shutter button is released, there is a malfunction in the shutter circuit. The malfunction is called "no strobe mode".

Steps 1 through 5 may be repeated to observe the operation of the meters. However, the "no strobe mode" check in step 5 cannot be done after the flash has fired five or more times. The flash battery may have discharged sufficiently to cause a "no strobe mode" even though there is no circuit malfunction.

B. CHECKING THE ELECTRONIC FLASH AND CAMERA WITH THE 360 METER CONNECTOR BLOCK

1. Connect the electronic flash (with the switch in the "OFF" position) to the 360 Meter Connector Block and then slide the block onto the camera (Figure 2-8).

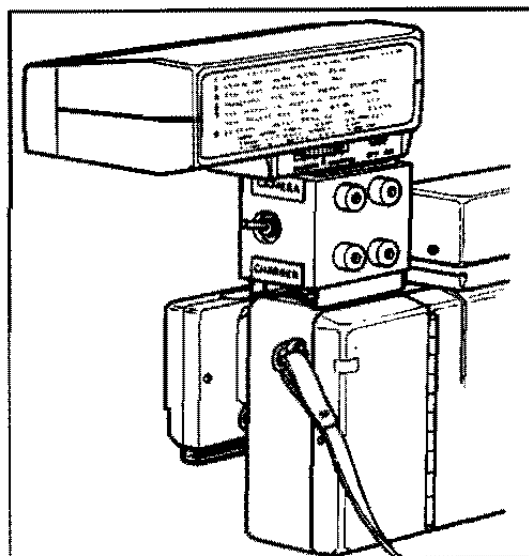


FIG. 2-8 TEST SETUP

2. Set the selector switch on the block to "Camera".
3. Set a VOM to the 3-vdc scale. Insert the positive probe into the top green jack and the negative probe into the black jack.
4. Turn the flash switch to the "ON" position and **allow the capacitor to charge**. Once charged, the meter should indicate a voltage between 2.2 and 2.5-vdc.
5. If the meter indicates half battery voltage or no battery voltage, the battery is defective and should be replaced.
6. Turn the flash switch "OFF".
7. Remove the probes from the meter block and set the VOM on a scale that will indicate a voltage of 400-vdc or higher.
8. Insert the positive probe into the red jack and the negative probe into the black jack.
9. Turn the flash switch "ON" and observe the meter. The voltage should rise to between 350 to 365 volts. Adjust the converter to gain this reading (see Section 4).

—

—

1

—

7

—

—

1

SECTION 3 - PROBLEM ANALYSIS

Presented in this section of the Repair Manual are expanded testing procedures. These expanded procedures supplement the system checkout (Section II) by detailing methods of checking assemblies which cannot be tested with the 360 Analyzer. The correction action is included in these procedures.

Since this testing requires that assemblies be opened, a special section on safety precedes the special procedures. It is strongly recommended that all repair personnel thoroughly acquaint themselves with the information provided and that they follow the instructions exactly.

A. SAFETY

Dangerous voltages are present in the Model 360 Polaroid Land Camera. Repair personnel are urged to use extreme caution when handling Model 360 assemblies which have been opened. Danger areas include the following:

1. The terminals of the 1240 uf flash capacitor in the flash assembly: The capacitor could be charged to 360 volts if it is on the camera or on the charger and the flash switch is on. In the case of a faulty dump switch, the capacitor could retain the 360 volts even after it has been removed from the camera or the charger. It is best to assume that the capacitor is "hot". Dump the charge using a 25 watt, 250 ohm resistor. NEVER ATTEMPT TO SHORT THE CAPACITOR WITHOUT USING A 250 OHM RESISTOR.
2. The converter circuit: If the converter circuit compartment is open and the converter is on, a dangerous condition exists. DO NOT TOUCH THE TERMINALS OF THE CONVERTER CIRCUIT OR ANY OF THE LEADS ON THE CIRCUIT BOARD ITSELF.
3. The battery charger: If the charger is plugged into a 110 vac outlet and the bottom of the unit is open, be extremely careful. AVOID ANY OF THE LEADS ON THE CHARGER CIRCUIT BOARD.

REMEMBER - 360 VOLTS IS DANGEROUS. USE CAUTION!

B. SPECIAL PROCEDURES

The following special procedures may be considered to be an extension of the system checkout described in Section II. The procedures expand camera and flash testing to those areas which can-

not be examined with the 360 analyzer. They should be performed when camera/flash malfunctions are not isolated by the system checkout.

1. Checking the Flash Battery Cells Under Load

- a. Slide a camera connector which has a one ohm, 25 watt resistor soldered to the battery terminal leads onto the flash connector (see Figure 3-1).

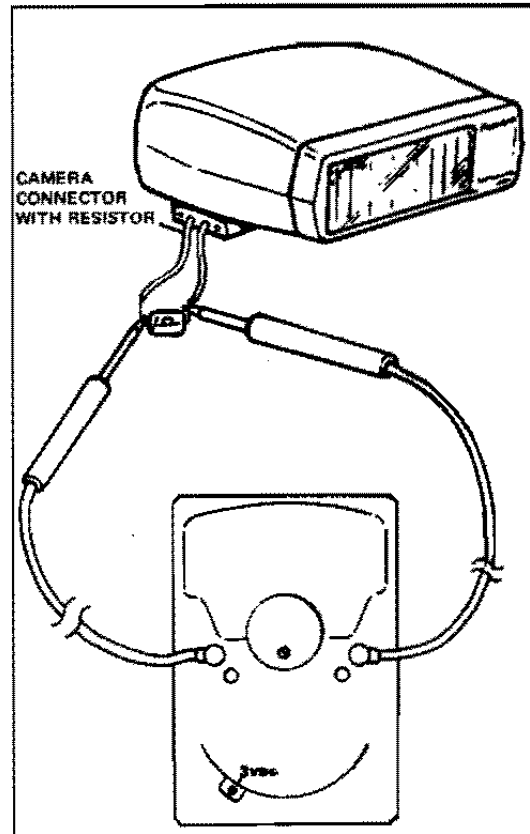


FIG. 3-1 TESTING THE FLASH BATTERY UNDER LOAD

- b. Set a VOM (or comparable meter) to the 3-vdc scale and place the probes on the resistor leads. The meter should read a minimum of 2.5 volts. If there is no reading, the battery might be dead, the flash connector defective, or the ON-OFF switch defective.
- c. If the reading is low, open the flash assembly in accordance with instructions given in Section IV. (As a precautionary measure, drain the 1240 uf capacitor using a 250 ohm resistor.)

- d. Cut the covering over the battery cell as shown in Figure 3-2.

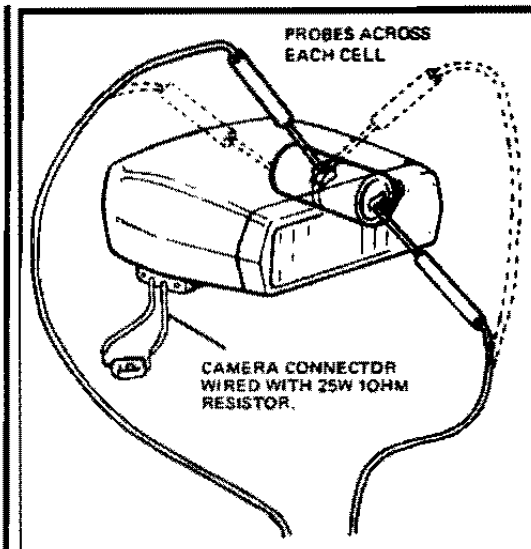


FIG. 3-2 TESTING EACH BATTERY CELL

- e. Place the meter leads across each cell as shown and record the readings. The voltage across each cell should be identical. If they are not identical, replace the battery.
- f. Remove the camera connector with the one ohm resistor.

2. Checking the Trigger Coil and the Trigger Circuit

- a. Pull back the sleeving on the high voltage lead of the trigger coil (Figure 3-3) and unsolder the lead as shown.

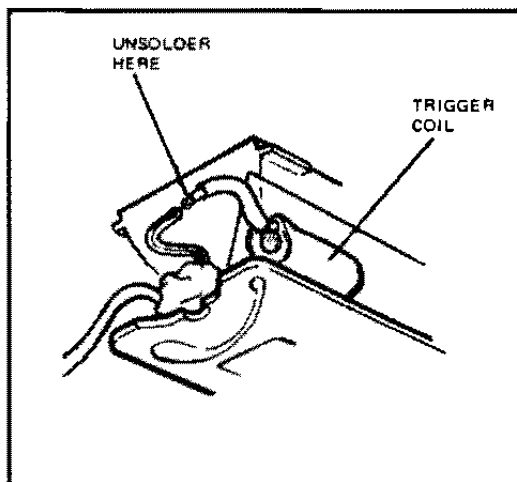


FIG. 3-3 UNSOLDERING THE TRIGGER COIL LEAD

- b. Slide the flash onto the camera and turn the ON-OFF switch ON.

- c. When the flash capacitor has charged, (converter light blinking), hold the unsoldered lead about an 1/8 of an inch from the solder connection on the board (Figure 3-4) with a pair of insulated-handled, needle nose pliers. DO NOT TOUCH THE WIRE CONDUCTOR.

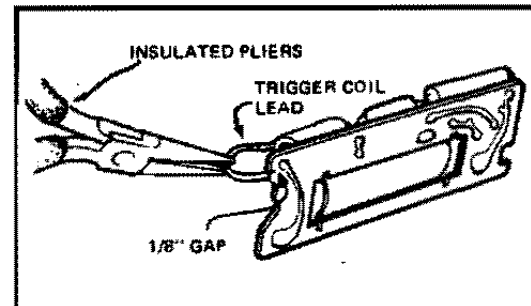


FIG. 3-4 CHECKING FOR TRIGGER ARCING

- d. Cock and release the shutter twelve to fifteen times. There should be an arc jumping from the unsoldered lead to the solder point on the board each time the shutter is released. If there is an arc, the trigger coil and the rest of the trigger circuit is operating satisfactorily. If there is no arc, continue as outlined below.

- e. With a VOM (or comparable meter) set up as shown in Figure 3-5, place the probes on the two points shown in the illustration.

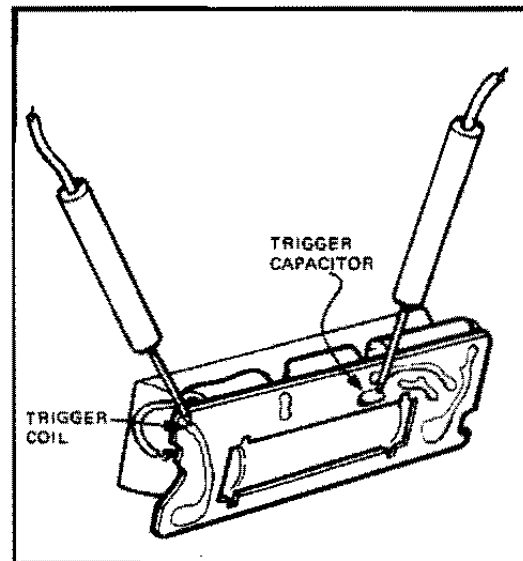


FIG. 3-5 TRACING THE TRIGGER CIRCUIT

- f. Cock the shutter - The meter should rise to a voltage range of 180 vdc to 300 vdc, depending on the meter's internal resistance. If no arc is observed in step d, but the meter reads 180-300 vdc, the trigger coil is defective and should be replaced. If there is no meter reading, there is a fault in the trigger circuit other than the trigger coil. Inspect the circuit board for breaks, cold-soldered components, etc., and make the necessary repairs.
- g. Remove the flash assembly from the camera and assemble it according to instructions in Section IV.

3. Checking the Operation of the Flash Circuit

- a. Clip a flash connector onto the camera foot assembly.
- b. Set a VOM (or comparable meter) to the RX1 scale and clip the probes to the violet and white leads of the flash connector.
- c. With the shutter uncocked, the meter should read zero ohms.
- d. Cock the shutter - The meter should indicate infinity.
- e. If either indication is not obtained, the flash switch on the shutter is defective and must be repaired. (See the "Automatic Shutter" portion of this section.)
- f. Remove the flash connector from the camera.

4. Checking Converter Input Voltage

- a. Open the converter compartment according to the instructions provided in Section IV of this manual.
- b. Clip the flash onto the camera and turn the ON-OFF switch ON.
- c. Set a VOM (or comparable meter) at 3 vdc and place the probes on the converter terminals which hold the black and brown wires (Figure 3-6).
- d. The VOM should indicate between 2.2 and 2.7 vdc. If there is no reading and the flash battery has been found to be OK, the foot assembly on the camera is faulty and must be repaired or replaced.
- e. Reassemble the converter compartment in accordance with instructions in Section IV.

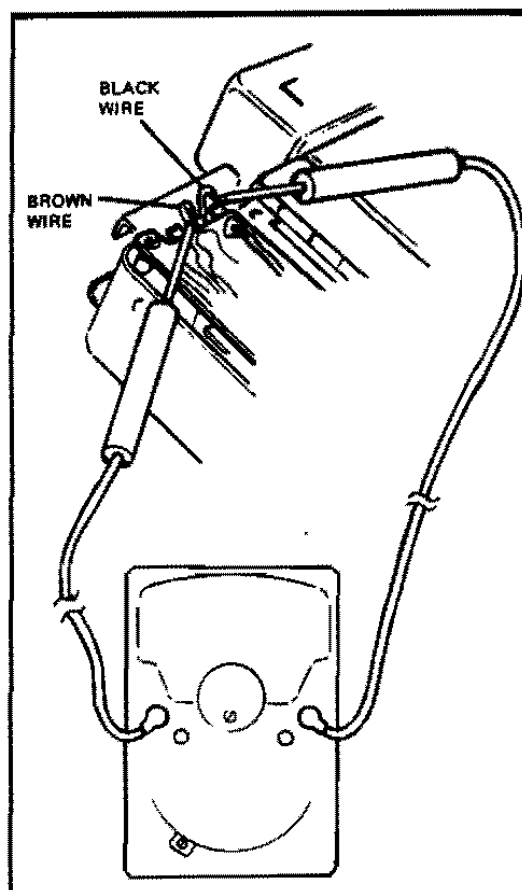


FIG. 3-6 CHECKING CONVERTER INPUT VOLTAGE

5. Testing Electronic Components

In the course of checking the model 360 camera, it will be necessary to test electronic components. This paragraph explains how the components should be tested. (The base block assembly must first be released from the camera according to the instructions in Section IV.)

Resistors

- a. Unsolder one of the leads from the circuit board.
- b. Consult the shutter schematic to determine the value of the resistor and set a VOM to the corresponding scale.
- c. Place the probes of the VOM on each of the resistor leads. The meter should register the resistance of the component. If the VOM does not register at all, the resistor is open and should be replaced.

Capacitors

- a. Unsolder one of the leads from the circuit board.
- b. Place the probes of a VOM (set on any resistance scale) on each lead of the capacitor. The VOM will deflect slightly and then will slowly start to drop back. This indicates the capacitor has charged.
- c. Reverse the VOM probes on the capacitor leads. The VOM should deflect all the way over and then slowly drop back, indicating that the capacitor has discharged. If the VOM deflects and does not drop back, either before or after the probes have been reversed, the capacitor is shorted and should be replaced. If the VOM does not deflect at either position of the probes, the capacitor is open and must be replaced.

Diodes

- a. Place the probes of a VOM on each of the diode leads. There should be no reading.
- b. Reverse the probes on the diode leads. The meter needle should deflect. If it doesn't, the diode is defective and should be replaced.

Photocell

- a. Set the aperture wheel on the base block assembly to 3000 and position the scene selector so the large aperture appears under the light baffle. (This is the "Bright Sun or Dull Day also Flash" setting.)
- b. Allow the base block assembly to lie flat on the work bench as shown in Figure 3-7.
- c. Set a VOM to the RX1000 scale. Hold the positive probe to the positive photocell contact and the negative probe to the negative photocell contact.
- d. With the probes still on the contacts, slowly lift the base block assembly off the workbench, exposing the photocell to light. The VOM needle should deflect toward zero. If it doesn't, the photocell is defective and should be replaced.

C. BATTERY CHARGER

The following procedures supplement the System Checkout described in Section II. Complete the procedures if the proper battery charger readings were not obtained or if any other charger fault is suspected. The charts at the end of this section summarize the information.

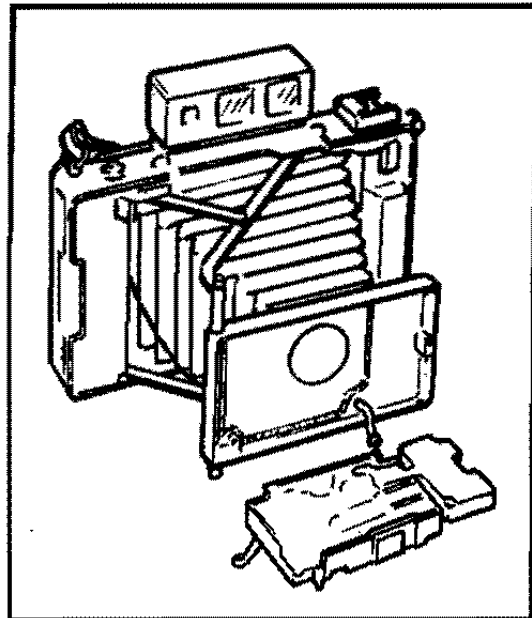


FIG. 3-7 TESTING THE PHOTOCELL

1. Visually inspect the battery charger: Examine the battery charger for bad cracks or for a faulty cord. Replace the battery charger if either condition exists.
2. If in the system checkout, the 360 analyzer "Input Current" meter did not indicate a minimum of 0.80 amps: The battery charger is defective and must be replaced.
3. If in the system checkout, the 360 analyzer "Capacitor" meter did not rise, either the high voltage diodes or the switch in the charger are defective and the battery charger must be replaced.
4. If in the system checkout, the fast charger lamp did not go on when the flash was clipped on:
 - a. Clip the flash assembly onto the 360 analyzer. Turn the ON-OFF switch ON.
 - b. Hold down the "Battery Discharge" switch for a moment to drain the flash battery cells.
 - c. Plug the charger into a 110 vac outlet and attach the female connector on the analyzer to the charger.
 - d. If the "Input Current" meter indicates a full charge (at least 0.80 amps) and the charger lamp does not light, the lamp is defective and must be replaced according to the instructions in Section IV.

- e. If the "Input Current" meter indicates approximately half a full charge and the lamp is dim, one of the rectifiers in the charger is burned out and the battery charger must be replaced.
5. If in the system checkout the fast charger lamp stayed on for more than 120 minutes:

- a. Check for a defective flash battery as instructed in the "Electronic Flash" portion of this section.
- b. Either the charger is improperly adjusted, or there is a defective component in the charger. In either case, the battery charger must be replaced.

PROBLEM ANALYSIS CHART		
BATTERY CHARGER		
PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
360 Analyzer "INPUT CURRENT" meter or VOM does not indicate minimum of 0.80 amps.	Battery charger defective.	Replace battery charger.
360 Analyzer "CAPACITOR" meter or VOM does not rise to maximum of 340 volts.	High voltage diodes or switch in charger defective.	Replace battery charger.
Fast charge light will not go on.	1. Flash battery is already charged. 2. Flash ON-OFF switch not "ON." 3. Defective flash ON-OFF switch. 4. Charger lamp burned out. 5. Defective connector on charger or flash.	1. None. 2. Turn switch "ON." 3. Replace flash assembly. 4. Replace charger lamp. 5. Replace charger or flash assemblies.
Fast charge light stays on for more than 120 minutes.	1. Defective flash battery. 2. Incorrectly adjusted battery charger. 3. Defective battery charger.	1. Replace flash battery. 2. Replace battery charger. 3. Replace battery charger.
Charger will not charge flash to fire a minimum of 20 shots.	Charger potentiometer not adjusted properly.	Adjust battery charger.

D. MODEL 385 AUTOMATIC SHUTTER

The following procedures should be performed if the specified shutter speeds were not realized during the System Checkout or if any other shutter fault is suspected. This information is summarized in the Problem Analysis Charts at the end of the section.

1. Release the base block assembly from the camera: Follow the instructions in Section IV, up to the point of unsoldering the shutter leads. Do not unsolder the leads. Consult the "Repair Manual on Model 362, 366, and 374 Automatic Shutters" for instructions on adjusting switches and replacing parts.
2. Visually inspect the shutter:
 - a. Check all solder connections. Look for cold, poorly or over-soldered joints and for excessively long component leads. Resolder and trim the leads as necessary.
 - b. Check for mechanical binds in the cocking action. Slowly depress the cocking arm several times; this motion should enable any mechanical binding to be felt or seen. Repair or replace the defective components as necessary.
 - c. Check the alignment of the aperture wheel. A large aperture in the wheel must be aligned with the right-hand edge of the aperture in the front light baffle (Figure 3-8). Simply loosen the adjusting screw in the readout actuator and rotate the aperture wheel as necessary. Retighten the adjusting screw. Apply a small amount of glyptol to the screw.

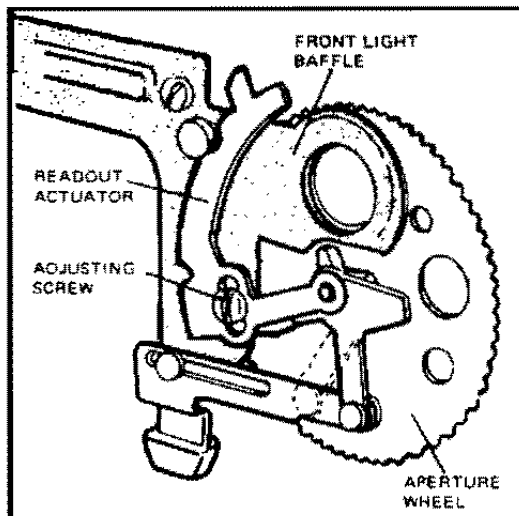


FIG. 3-8 ALIGNING THE APERTURE WHEEL

- d. Check the detent action of the readout indicator and aperture wheel. Simply move the scene selector back and forth and rotate the aperture wheel several times. If excessive looseness is evident in either detent action, replace the aperture wheel and readout actuator assembly.
- e. Check the flash switch (Figure 3-9). (In some shutters, the contacts of the Ss switch will be welded together.) With the

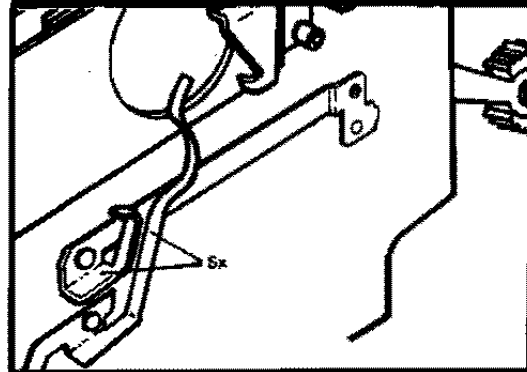


FIG. 3-9 CHECKING THE FLASH SWITCH

shutter cocked, the contacts of the Sx switch should be open. Trip the shutter and the Sx contacts should close. If either switch is defective, replace it.

- f. Check the photocell. Simply look for discoloration in the photocell element. A bluish-gray, or burnt looking element indicates that the photocell is defective, and must be replaced.
- g. Check the S2 timing switch. First, be sure that the rubber insulator is in position at the end of the switch contact. (In some shutters the insulator is built into the switch contact.) The insulator should protect the contact from the blade latch (Figure 3-10) without interfering with the closing of the switch. In the cocked position, the switch should be closed. When the shutter is tripped, the switch should open.

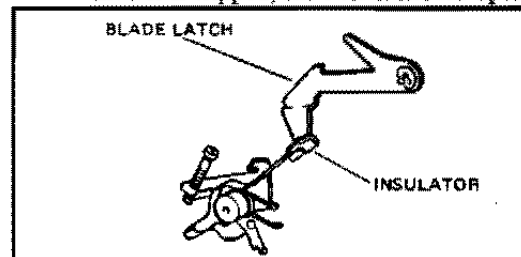


FIG. 3-10 INSULATION ON THE S2 TIMING SWITCH

A line drawing of the rear of the unit. It shows a rectangular shape with a large circular opening in the center. To the right of the opening, there is a vertical post. A label 'INSULATION' with a line pointing to a small rectangular area on the right side of the unit. Another label 'INSULATED POST' with a line pointing to the vertical post on the right side of the unit.

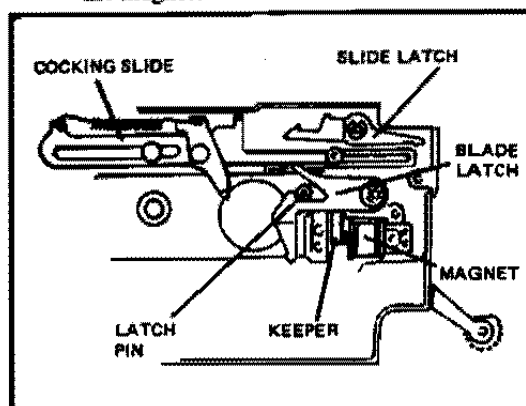
3. If the shutter readings were a constant half stop fast (at all speed settings) during the System Checkout, replace the integrated circuit. If the shutter readings were slow (at all speed settings), replace the photocell.

BLUE
BLACK
RED
YELLOW
GREEN
WHITE
ORANGE

F
A
S
T
E
R

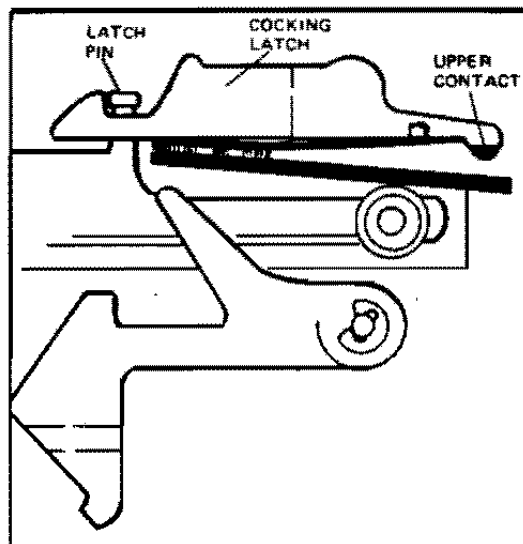
S
L
O
W
E
R

- 3-12). Observe the keeper. It should parallel with the edge of the blade and with the poles of the magnet. If it isn't, adjust the magnet.



d. Check the cocking slide latch pin. Examine the latch pin (Figure 3-13). If it is bent, the cocking slide will be released before SI is closed. Straighten the pin if necessary.

- d. Check the cocking slide latch pin. Examine the latch pin (Figure 3-13). If it is bent, the cocking slide will be released before SI is closed. Straighten the pin if necessary.



e. Check the adjustment of the S1 switch. The upper contact of the S1 switch should be visible below the cocking latch when the shutter is cocked (Figure 3-13). If it is not, bend down the cocking slide latch pin so that the cocking latch will be moved enough to expose the contact. (Do not bend the pin too far, or a mechanical bind may occur.)

- f. Check the adjustment of the S2 switch. Follow the procedure outlined in Section III of the "Repair Manual on Model 363, 366, and 374 Automatic Shutters."
- g. Check the alignment of the photocell. The photocell must be seated firmly in its socket. Adjust or replace the photocell if necessary.
- h. Check the resistance of the magnet coil. Place the probes of a VOM across the magnet contacts. The meter reading should be between 80 and 90 ohms. If the reading

is not within this range, replace the magnet.

- i. Perform the following continuity checks. If readings are not obtained in the continuity checks listed below, add jumper wires between the affected points. Section III of the "Repair Manual on Model 362, 366, and 374 Automatic Shutters" instructs personnel on the proper methods of adding jumpers. With a meter set to the RX 1 scale, check point-to-point as follows. Use Figure 3-14 for locations of designated points.

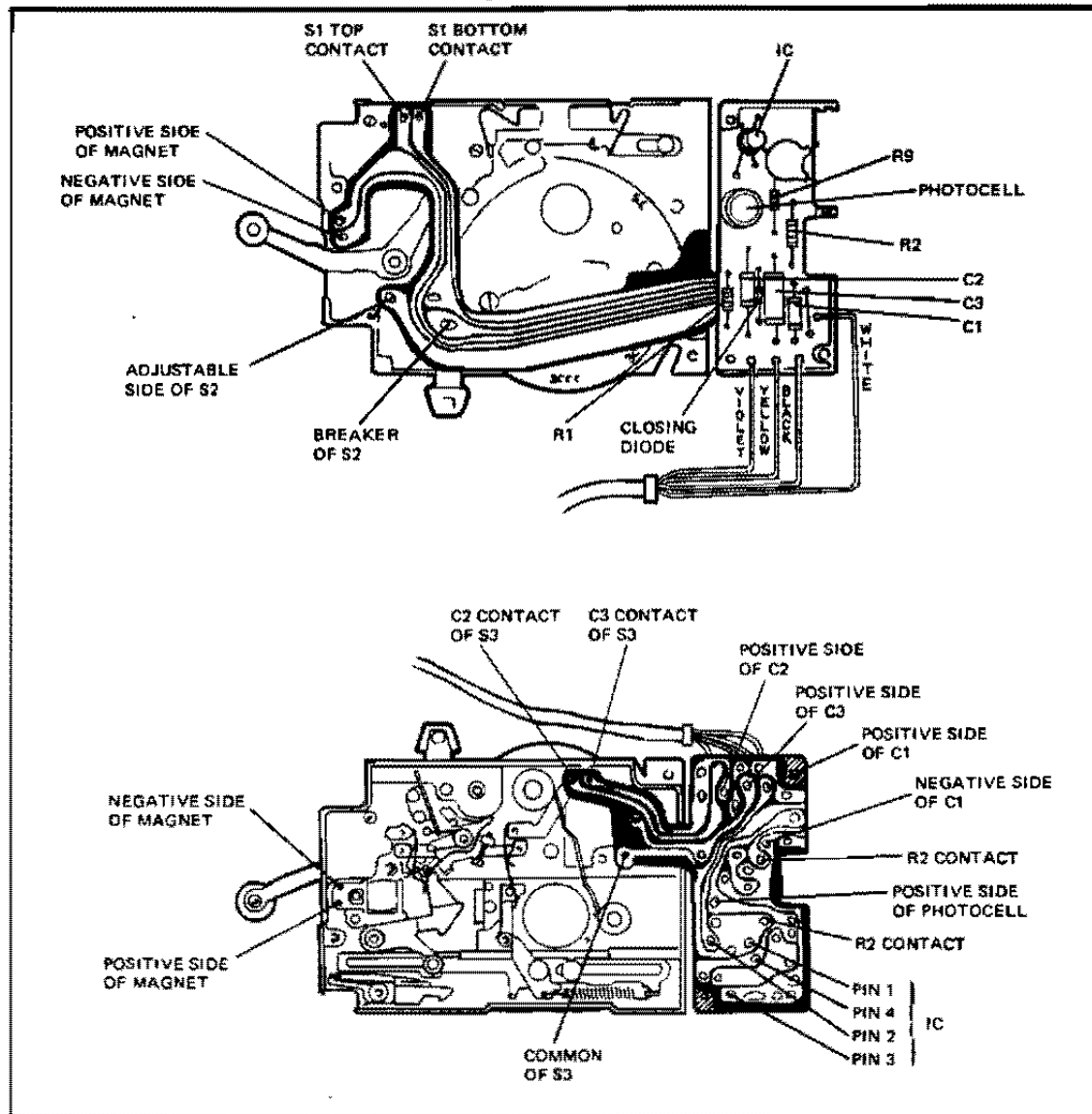
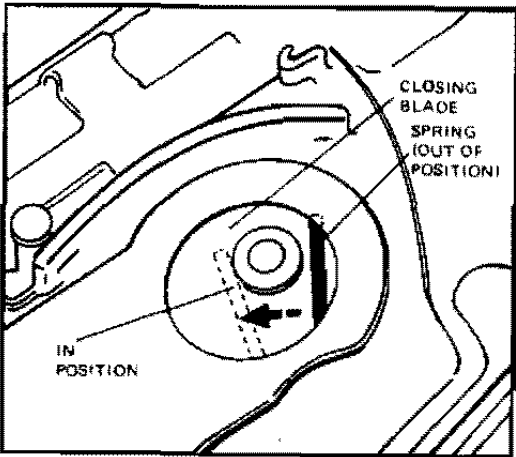


FIG. 3-14 LOCATION OF TEST POINTS

FROM	TO
Negative contact of C1	Adjustable side of S2
Breaker of S2	Resistor R2
Positive side of magnet	Positive side of photocell
Negative side of magnet	Pin 2 of the IC
Bottom contact of S1	Black battery wire
Top contact of S1	Negative side of capacitor C1

- j. Check the continuity of S1. Place the probes of a VOM across the S1 contacts and manually close the switch. If no reading is obtained on the VOM, clean the switch contacts with a fine file and recheck. If there is still no reading, replace the switch.
 - k. Check the photocell. Use a VOM as instructed in a preceding paragraph.
 - l. If none of steps a through k above SOLVE THE SHUTTER PROBLEMS, REPLACE THE INTEGRATED CIRCUIT AND RE-TEST. IF THE SHUTTER IS STILL DEFECTIVE, REPLACE THE ENTIRE BASE BLOCK ASSEMBLY.
5. If the second (closing) blade stays open on all speeds:
 - a. Check the adjustment of the S2 switch. Follow the procedure outlined in Section III of the "Repair Manual on Model 363, 366, and 374 Automatic Shutters."
 - b. Check the spring on the second (closing) blade. If the spring has slipped out of position (Figure 3-15), remove the scene selector, aperture wheel and light baffle and return the spring to its proper position.
- 
- FIG. 3-15 SECOND BLADE SPRING
- c. Check for a shorted C1. Test the capacitor (with the shutter uncocked) using a VOM. If the capacitor is shorted, replace it.
 - d. Check the photocell. Use a VOM as instructed in a preceding paragraph.
 - e. If none of steps a through d above SOLVE THE SHUTTER PROBLEMS, REPLACE THE INTEGRATED CIRCUIT AND RE-TEST. IF THE SHUTTER IS STILL DEFECTIVE, REPLACE THE ENTIRE ASSEMBLY.
6. If the second (closing) blade stays open on all speeds except 3000-dull:

Check capacitor C2. If the capacitor is shorted, replace it.
 7. If the blades close together only on 3000-dull:
 - a. Check capacitor C1. If the capacitor is open, replace it.
 - b. Check for cold-soldering. Inspect the points where C1 is soldered to the flexible circuit. Resolder the junctions as necessary.
 8. If the shutter speed was too slow at 75-dull-50:

Replace capacitor C2.
 9. If the shutter speed was very fast or if there was no reading at all at 75-dull:
 - a. Check capacitor C2. If the capacitor is open, replace it.
 - b. Continuity check (refer to Figure 3-14). Check the continuity between the positive contact of C2 and the C2 contact of switch S3. Add a jumper if necessary.
 10. If at 75-bright the shutter speed was very fast, while at 75-dull it was OK:
 - a. Check capacitor C3. If open, replace the capacitor.
 - b. Continuity check (refer to Figure 3-14). Check the continuity between the positive

contact of C3 and the C3 contact of switch S3. Add a jumper if necessary.

11. If at 3000-dull the shutter speed was either too fast or too slow:
 - a. Replace capacitor C1.
 - b. Replace the photocell. If C1 is not defective, replace the photocell with one of the proper color grouping.
12. If the shutter speeds were very fast at all settings except 3000-dull:
 - a. Continuity check (refer to Figure 3-14). Check the continuity between the positive contact of C1 and the common contact of switch S3.
13. If the flash doesn't fire:
 - a. Check the flash switch. Refer to Figure 3-9 and check that the Ss contact is welded together (early shutters). Check that the Sx contact is open when the shutter is cocked and closed when the shutter is tripped.
 - b. Continuity check (refer to Figure 3-14). Check the continuity between the following points. Add jumpers if necessary.

FROM	TO
Sx contact	Violet shutter wire
X Connector	Black shutter wire
Pin 5 of foot assembly (Figure 3-16)	Yellow shutter wire

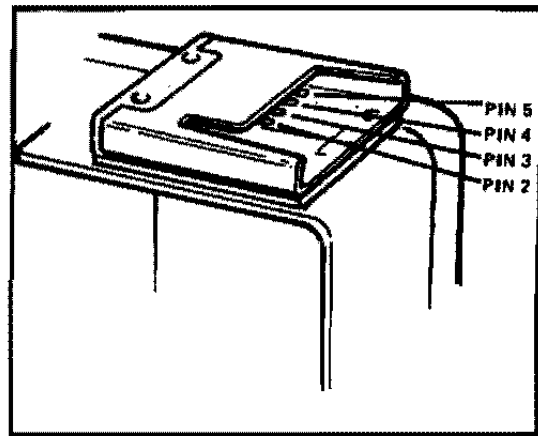


FIG. 3-16 FOOT ASSEMBLY PIN NUMBERS

14. If the blades remain open after the flash has fired:
 - a. Inspect resistor R9. Be sure R9 is properly soldered to the circuit board. Resolder the component if necessary.
 - b. Check the closing diode. Use a VOM as previously instructed.
 - c. Continuity check (refer to Figure 3-14). Check the continuity between pin 12 of the converter board's integrated circuit and the yellow battery wire. Also check the continuity of the yellow wire from terminus to terminus.

PROBLEM ANALYSIS CHART MODEL 385 AUTOMATIC SHUTTER		
PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Shutter reads a half stop fast on all speeds.	Defective IC.	Replace the IC.
Shutter reads slow on all speeds.	Defective photocell.	Replace the photocell.
Both blades close together-all speeds.	1. Rust or foreign matter on magnet, keeper or blades. 2. Magnet and keeper misaligned. 3. Bent cocking latch pin. 4. S1 switch out of adjustment. 5. S2 switch out of adjustment. 6. Photocell misaligned. 7. Open S1 switch. 8. Defective magnet coil. 9. Defective photocell. 10. Defective IC. 11. Open between negative contact of C1 and adjustable side of S2. 12. Open between breaker side of S2 and resistor R2. 13. Open between positive side of magnet and positive side of photocell. 14. Open between negative side of magnet and pin 2 of the IC. 15. Open between the bottom S1 contact and the black battery wire contact. 16. Open between the top S1 contact and the negative side of C1. 17. Cold solder at junction of brown and black wires at center terminal of converter.	1. Clean dirty components or replace rusted components. 2. Adjust magnet to realign it with the keeper. 3. Straighten pin or replace cocking latch. 4. Adjust S1 switch. 5. Adjust S2 switch. 6. Realign photocell in its socket. 7. Clean switch contacts. 8. Replace magnet coil. 9. Replace photocell. 10. Replace the IC. 11. Add a jumper wire between the affected points. 12. Add a jumper wire between the affected points. 13. Add a jumper wire between the affected points. 14. Add a jumper wire between the affected points. 15. Add a jumper wire between the affected points. 16. Add a jumper wire between the affected points. 17. Resolder wires.

**PROBLEM ANALYSIS CHART
MODEL 385 AUTOMATIC SHUTTER**

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Second (closing) blade stays open on all speeds.	1. S2 switch out of adjustment. 2. Spring disengaged from closing blade. 3. C1 defective. 4. Defective photocell. 5. Defective IC.	1. Adjust S2 switch. 2. Reposition spring on closing blade. 3. Replace C1. 4. Replace the photocell. 5. Replace the IC.
Second (closing) blade stays open on all speeds except 3000 dull.	C2 defective.	Replace C2.
Blades close together only on 3000 dull.	C1 defective.	Replace C1.
75-dull too slow.	C2 defective.	Replace C2.
75-dull very fast or no reading.	1. Open between positive contact of C2 and C2 contact of S3. 2. C2 defective	1. Add a jumper wire between the affected points. 2. Replace C2.
75-bright very fast while 75-dull OK.	1. Open between positive contact of C3 and C3 contact of S3. 2. C3 defective.	1. Add a jumper wire between the affected points. 2. Replace C3.
3000-dull too fast or too slow.	1. C1 defective. 2. Photocell defective.	1. Replace C1. 2. Replace the photocell.
All readings fast except 3000-dull.	Open between positive contact of C1 and common contact of S3.	Add a jumper wire between the affected parts.
Flash doesn't fire.	1. Ss open (early shutters). 2. Dirty or defective Sx switch. 3. Open between Sx and violet wire. 4. Open between Ss and black wire. 5. Open between yellow wire and pin 5 of foot assembly.	1. Weld contacts together. 2. Clean or replace switch contacts. 3. Add a jumper wire between the affected points. 4. Add a jumper wire between the affected points. 5. Add a jumper wire between the affected points.

PROBLEM ANALYSIS CHART MODEL 385 AUTOMATIC SHUTTER		
PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Blades stay open after flash fires.	1. R9 defective. 2. Closing diode defective. 3. Open between yellow wire and pin 12 of the converter circuit IC. 4. Yellow wire broken.	1. Replace R9. 2. Replace diode. 3. Add a jumper wire between the affected points. 4. Replace yellow wire.
Customer complaint: Pictures too light or too dark at high light levels.	S2 out of adjustment.	Adjust S2.

E. ELECTRONIC TIMER

The following procedures outline the steps to take if the electronic timer does not meet the requirements listed in Section II. If the requirements were not met, or if any other timer fault is suspected, complete these procedures. The information provided is summarized in the problem analysis chart at the end of the section.

1. If the timer battery did not meet the minimum 2.6 vdc requirement of the system checkout:

Replace the timer battery.

2. If the battery drain measured in the system checkout exceeded 10 microamps:

The timer filter capacitor is adversely affecting the battery and must be removed. Follow the instructions in Section IV.

3. If the timer is completely dead:

- a. Check the timer battery and replace it if necessary.
- b. Examine the timer switch. Be sure that it is "making" properly. If necessary, adjust or replace it according to the procedures in Section IV.
- c. Check for an open in the timer battery leads and the leads from the switch to the timer.
- d. If none of the above steps rectify the problem, replace the entire timer assembly.

4. If the timer is erratic in its timing cycles:

This is caused by a defective component and

requires that the entire timer assembly be replaced.

5. If the timer lamp doesn't light:

- a. Check the timer battery. If the battery is low or dead, replace it.
- b. Check the timer switch. Make certain that it "makes" properly. Perform the continuity check and adjustment procedure detailed in Section IV.
- c. Examine the circuit between the timer battery and the timer and between the switch and the timer for an open.
- d. If none of the steps above solves the problem, replace the entire timer assembly.

6. If there is no "beep" at the end of the timing cycle (after the lamp has lit):

The brass transducer plate may have slipped out of position. It must be repositioned in the manner noted in Section IV.

7. If the timer lamp will not go out after the timing cycle has been completed:

- a. Examine the timer switch. Be certain it has not "bridged" closed. Adjust the switch as noted in Section IV.
- b. If the switch is OK, there may be an internal short circuit in the timer assembly. Examine the unit for possible repair. If necessary, replace the entire timer assembly.

8. If the timer continues "beeping" after the timing cycle has been completed:

Replace the timer lamp.

PROBLEM ANALYSIS CHART ELECTRONIC TIMER		
PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Battery voltage low. (Less than 2.6 vdc as measured in System Checkout.)	Battery dead.	Replace timer battery.
Battery drain greater than 10 microamps (as measured in System Checkout).	Timer filter capacitor faulty.	Perform the procedure detailed in Section IV.
Timer completely dead. (No light, no sound.)	1. Timer battery dead. 2. Defective timer switch. 3. Defective timer.	1. Replace battery. 2. Adjust or replace the timer switch as detailed in Section IV. 3. Replace the timer assembly.
Timer is inaccurate.	Electronic component defective.	Replace timer assembly.
Lamp doesn't light.	1. Battery dead. 2. Bulb burned out. 3. Switch contacts not making. 4. Open in the timer circuit. 5. Defective timer.	1. Replace battery. 2. Replace lamp. 3. Adjust switch as detailed in Section IV. 4. Repair if possible, or replace the timer assembly. 5. Replace the timer assembly.
Lamp will not extinguish.	1. Switch contacts bridged. 2. Short circuit in the timer.	1. Repair or replace switch. 2. Repair or replace timer assembly.
No "beep" at end of timing cycle (after lamp has lit).	Brass transducer plate out of position.	Reposition transducer plate.
Timer "beeps" intermittently long after timing cycle completed.	Lamp burned out.	Replace the timer lamp.

F. ELECTRONIC FLASH

The following procedures provide the corrective actions for problems uncovered in the system checkout. These procedures should be completed if the specified readings were not obtained. The problem analysis charts at the end of the section summarize the information provided in the procedures. **REMEMBER TO OBSERVE ALL SAFETY PROCEDURES.**

1. Visually inspect the flash assembly:

Examine the body of the assembly for cracks or other cosmetic defects. Turn the "Darken-Lighten" wheel and listen for mechanical binds. Be sure the louvers turn freely. Open the louvers to the wide-open position and inspect the reflector. Be sure it is clean.

2. If the "Battery" meter did not rise to 2.5 vdc in the flash position of the system checkout:

- a. Check the flash battery as instructed in the Special Procedures section. If necessary, replace the battery.
 - b. If the battery is OK, examine the flash for an open circuit. Repair the open with a jumper.
 - c. If the meter still does not rise to 2.5 vdc, check the ON-OFF switch. If it is faulty, the entire flash assembly must be replaced.
3. If the "Capacitor" meter did not rise to the 350 to 365 vdc range:
 - a. If the reading was low, adjust the converter circuit as detailed in Section IV. If the reading is still low, continue below.
 - b. Be certain the dump switch is working properly.
 - c. Be sure the 1240 uf capacitor has been fully "formed" by fast charging the unit using the battery charger. If the flash has been fully charged and the reading is still low, check the battery charger.
 4. If the electronic flash is dead and will not accept a charge from the converter (converter completely dead with no light and no sound):
 - a. Check the flash battery as instructed in the Special Procedures section. If necessary, replace the battery.
 - b. Examine the circuit for an open. Repair the open with a jumper if possible.
 - c. Check the converter output voltage as previously instructed. Adjust the converter if the reading is low. If the reading cannot be brought within specification, replace the entire converter circuit.
 - d. Examine the connectors on the flash and on the camera. If the connector on the flash is faulty, the entire flash assembly must be replaced. If the camera foot assembly is defective, replace it according to instructions in Section IV.
 5. If the flash is dead and will not accept a full charge from the converter (converter light dim and low buzzing or squealing sound):
 - a. Check the dump switch. Be sure it is open. Reposition or tweak the contacts to assure the proper opening of the switch. Be certain that the yellow switch wire is not interfering with the opening of the switch. Also examine the mounting rivets on the switch. If there is excessive play, attempt to tap them down to hold the switch tightly. If this cannot be done, replace the flash assembly.
 - b. Examine the leads in the flash assembly. Be sure the leads to the 1240 uf capacitor are intact. Replace or splice them as necessary. Check the white wire between the negative end of the flash tube and the negative end of the battery. If necessary, splice this lead. Be sure the trigger capacitor lead is not touching the dump resistor lead.
 6. If the flash is dead and will not take a charge from the converter (while the converter light is bright but there is no sound):

The converter circuit is defective and must be replaced.
 7. If the flash will not fire after accepting a charge from the converter (converter light blinking):
 - a. Check the trigger circuit as specified in the Special Procedures section. If there is no arc, replace the trigger coil. Also examine the high voltage leads between the coil and flashtube and between the coil and circuit board. Be sure the trigger capacitor is properly soldered to the circuit board.
 - b. Check the flashtube. If it is cracked or broken, replace it. Be sure the ends of the flashtube are properly soldered.
 - c. Trace the lead between the negative end of the battery and negative end of the flashtube. Resplice it or replace it as necessary.
 - d. If all of the above check out OK, the flash connector may be defective. If so, replace the flash assembly.
 8. If the flash fires intermittently after the converter has charged the capacitor (converter light blinking properly):
 - a. Check the trigger circuit as specified in the Special Procedure section. If there is an intermittent arc, replace the trigger coil. Also examine the high voltage leads between the coil and flashtube and between the coil and circuit board. Be sure the trigger capacitor is properly soldered to the circuit board.
 - b. Check the flashtube. If it is cracked, broken or burned, replace it. Be sure the ends of the flashtube are properly soldered.
 - c. Check that the leads of the trigger capacitor are properly soldered to the board.
 9. If after receiving a full charge the flash will

not fire a minimum of 20 times:

Recharge the flash using a different battery charger (one that is known to be good). If you obtain more than 20 flashes, the original charger is defective and must be replaced. If you obtain less than 20 flashes, replace the flash battery.

10. If the flash fires when it is clipped onto the camera:

The dump switch is faulty. Attempt to tweak the switch contacts so they operate in the proper manner. If they cannot be repaired, replace the entire flash assembly.

11. If the flash smokes when the ON-OFF switch is turned ON (flash not on camera):

There is a short circuit in the flash assembly wiring. Replace the flash assembly.

12. If the louvers do not move freely:

- Examine the flash for foreign objects or for wires interfering with the mechanical linkage. Clean the flash and reposition the wires.
- Check the position of the reflector, circuit

board, and flashtube. Reposition these components as necessary.

- Be sure that all the springs are in place in the linkage.

13. If it has been determined that the flash light output is too high:

The converter voltage adjustment is too high and must be readjusted.

14. If it has been determined that the flash light output is too low:

- The converter voltage adjustment may be too low and must be readjusted.
- The flash reflector is dirty and must be cleaned.
- The louvers are dirty or sticking. Clean the louvers and the mechanical linkage.
- The "Lighten-Darken" knob has slipped out of adjustment. Adjust the knob in the manner specified in Section IV.
- The circuit board and reflector have moved out of position. Reposition the board and reflector.

PROBLEM ANALYSIS CHART

ELECTRONIC FLASH

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
"Battery" meter did not rise to 2.5 vdc in System Checkout.	1. Flash battery is defective. 2. Open in the flash circuit. 3. Defective ON-OFF switch.	1. Replace battery. 2. Add a jumper wire if possible. If not, replace flash assembly. 3. Replace flash assembly.
"Capacitor" meter or VOM did not rise to 350-365 vdc in System checkout.	1. Converter circuit not adjusted. 2. Dump switch defective. 3. 1240 uf capacitor leaking.	1. Adjust converter. 2. Repair if possible or replace flash assembly. 3. Replace capacitor.
Flash is dead and will not accept charge from converter circuit. (Converter light out and no sound)	1. Low or dead flash battery cell. 2. Defective flash ON/OFF switch. 3. Defective converter. 4. Defective flash connector. 5. Defective camera foot ass'y.	1. Replace flash battery. 2. Replace ON/OFF switch. 3. Replace converter. 4. Replace flash assembly. 5. Replace foot assembly.

PROBLEM ANALYSIS CHART

ELECTRONIC FLASH

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Flash is dead and will not accept full charge from converter circuit. (Converter light dim and low buzzing or high squaling sound.)	1. Dump switch not open. 2. Yellow dump switch wire out of position holding switch closed. 3. Stationary dump switch contact out of position. 4. Mounting rivet on dump switch loose. 5. Broken lead or defective solder connection to 1240 uf capacitor. 6. Broken lead (white wire) or defective connection between negative end of battery and negative end of flashtube. 7. Trigger capacitor lead touching dump resistor lead.	1. Tweak the switch if possible or replace the flash assembly. 2. Reposition wire and resolder if necessary. 3. Reposition the contact if possible or replace the flash assembly. 4. Tap rivet down tightly if possible or replace flash assembly. 5. Replace or splice lead and/or resolder as necessary. 6. Replace or splice lead and/or resolder as necessary. 7. Separate component leads.
Flash is dead and will not accept charge from converter circuit. (Converter light bright with no sound.)	Defective converter.	Replace converter.
Flash will not fire after converter has charged the capacitor. (Converter light blinking.)	1. Defective trigger coil. 2. Defective high voltage winding. 3. Faulty high voltage lead between coil and flashtube. 4. Faulty high voltage lead between coil and circuit board. 5. Arcing at end of trigger coil. 6. Defective flashtube (cracked, broken, or burned). 7. Ends of flashtube not soldered properly.	1. } 2. } 3. Replace trigger coil. 4. } 5. } 6. Replace flashtube. 7. Resolder as necessary.

PROBLEM ANALYSIS CHART

ELECTRONIC FLASH

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Flash will not fire after converter has charged the capacitor. (Converter light blinking.) (Continued from previous page.)	8. Splice of high voltage lead (between trigger coil and flashtube) not made properly. 9. Leads of trigger coil or trigger capacitor not properly soldered to circuit board. 10. Broken lead (white wire) or defective connection between negative end of battery and negative end of flashtube. 11. Defective flash ON-OFF switch. 12. Defective flash connector. 13. Defective flash wiring.	8. Resplice leads. 9. Resolder components to circuit board. 10. Replace or splice lead and/or resolder as necessary. 11. } Replace flash assembly. 12. } 13. }
Flash fires intermittently after converter has charged the capacitor. (Converter light blinking.)	1. Defective trigger coil. 2. Defective high voltage winding. 3. Faulty high voltage lead between coil and flashtube. 4. Faulty high voltage lead between coil and circuit board solder connection. 5. Arcing at end of trigger coil. 6. Defective flashtube (cracked, broken or burned). 7. Ends of flashtube not soldered properly. 8. Splice of high voltage lead between trigger coil and flashtube not made properly. 9. Leads of trigger coil or trigger capacitor not properly soldered.	1. } Replace trigger coil. 2. } 3. } 4. } 5. } 6. Replace flashtube. 7. Resolder as necessary. 8. Resplice leads. 9. Resolder components to circuit board.
Flash will not fire a minimum of 30 times after being charged.	1. Defective flash battery. 2. Flash battery not properly charged because of faulty ON-OFF switch. 3. Flash battery not properly charged because of defective battery charger.	1. Replace the battery. 2. Replace flash assembly. 3. Replace the battery charger.

PROBLEM ANALYSIS CHART

ELECTRONIC FLASH

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Flash fires when it is clipped onto the camera.	Faulty dump switch.	Repair or replace entire flash assembly.
Flash smokes (not on camera) when ON-OFF switch turned ON.	Short circuit in the flash assembly.	Inspect all wiring and solder connections. Repair if possible or replace entire flash assembly.
Louvers do not move freely.	1. Circuit board and reflector out of position. 2. Foreign object in louvers or linkage. 3. Flashtube out of position. 4. Spring missing from linkage.	1. Adjust board and reflector. 2. Clean flash assembly and position wires properly. 3. Reposition flashtube. 4. Replace spring.
Strobe will not turn off.	1. ON-OFF switch bridged by solder. 2. Defective ON-OFF switch.	1. Clean and resolder. 2. Replace flash assembly.
Flash light output too high.	Converter voltage adjustment too high.	Adjust converter.
Flash light output too low.	1. Converter voltage adjustment too low. 2. Flash reflector dirty. 3. Louvers dirty or sticking. 4. Lighten-Darken knob not adjusted properly. 5. Circuit board and reflector out of position. 6. Low value photoflash capacitor.	1. Adjust converter to 350-365 volts. 2. Clean flash reflector. 3. Clean louvers and mechanical linkage. 4. Adjust Lighten-Darken knob as instructed in Section IV. 5. Adjust board and reflector. 6. a) Change capacitor (use a Sprague capacitor). b) Install a clear bezel.
"No strobe mode."	1. Closing diode reversed. 2. Leads of closing diode or resistor R9 not properly soldered. 3. Flash battery discharged.	1. Install diode in proper position. 2. Resolder components to circuit board. 3. Recharge flash assembly on fast charger.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
84

SECTION 4 - REPAIR AND ADJUSTMENT PROCEDURES

This section of the repair manual contains instructions for the repair and adjustment of Model 360 assemblies. CONSULT THE SAFETY PORTION OF SECTION III BEFORE ATTEMPTING ANY REPAIRS.

A. BATTERY CHARGER

Replacing the Charger Lamp

Removal

- a. Peel the two foam rubber pads off the bottom of the charger (Figure 4-1).

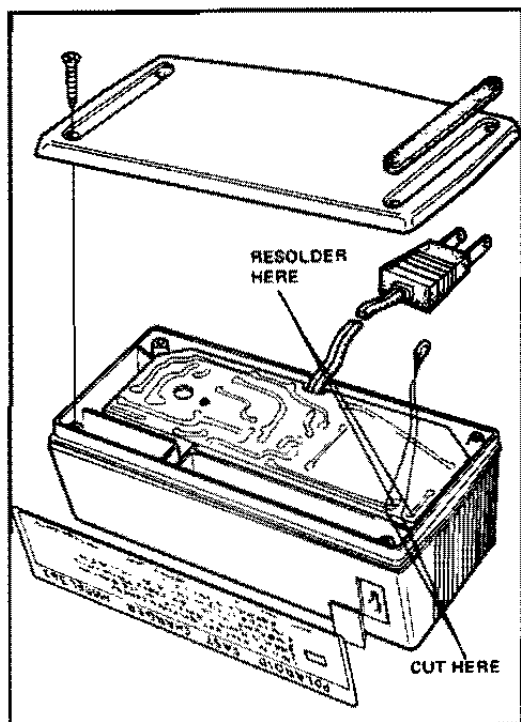


FIG. 4-1 REPLACING THE CHARGER LAMP

- b. Remove the four Phillips head screws and lift off the bottom cover.
- c. Carefully remove the lamp from its holder and extend the leads to their full length.
- d. Cut the leads at the points shown in Figure 4-1.

Replacement

- a. Solder the leads of a new lamp to the solder connections shown in Figure 4-1.
- b. Place the lamp into its holder.

- c. Position the bottom cover on the battery charger and secure it using the four Phillips head screws.

- d. Adhere the two foam rubber pads in place.

B. MODEL 385 AUTOMATIC SHUTTER

Replacement of the Base Block and Electronic Mounting Board Assembly

Removal

- a. Extend the bellows until the detent lock snaps into place. Cock the shutter.
- b. Remove and discard the top etch plate from the shutter housing using a pair of tweezers.
- c. Remove the three shutter fastening screws from the bellows side of the shutter housing (two short screws and a longer screw at the top of the cable release cover). Separate the shutter casting.
- d. Remove the two screws holding the base block and the two screws holding the electronic mounting block. Carefully lift the entire assembly out of the shutter casting.
- e. Using an Unger solder gobbler (or equivalent), unsolder the four leads from the printed circuit. Remove and discard the old base block and electronic mounting block assembly.

Replacement

- a. Solder the four leads to the printed circuit board of a new base block and electronic mounting board assembly. Use Figure 4-2 as a guide for the solder locations of the four leads.

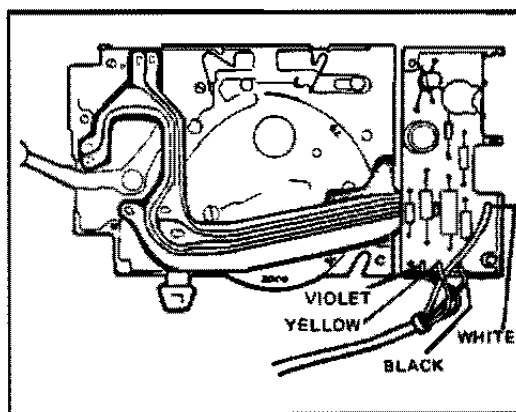


FIG. 4-2 LOCATION OF WIRES ON ELECTRONIC MODULE

- b. Position the assembly in the shutter casting and replace the two screws in the electronic mounting block and the two screws in the base block.
- c. Reassemble the front casting and the rear casting using the three shutter fastening screws.
- d. Trip the shutter a few times and move the aperture wheel through its settings to be sure there is no binding.
- e. Peel the backing off a new etch plate and adhere the plate to the shutter.

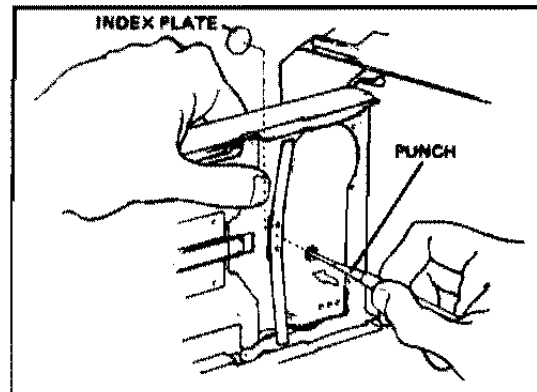


FIG. 4-3 FORCING OUT THE INDEX PLATE

C. ELECTRONIC TIMER SYSTEM

1. Replacing the Electronic Timer

Removal

- a. Open the rear door and force out the index plate from the knob using a 1/16th inch drive pin punch (Figure 4-3).
- b. Remove the potentiometer driving knob by prying it away from the timer using a fine blade screwdriver (Figure 4-4).
- c. Remove the electrical nameplate: Carefully pry one edge of the nameplate loose using a fine blade screwdriver. Peel the nameplate free of the rear door using pliers (Figure 4-5).

- d. Open the rear door and unsolder the black and white leads (identified in Figure 4-6) from the timer.
- e. Remove the rear door from the rear door spider: Remove the two rear door rivets and the two timer assembly rivets using a De-Staco tool with anvil B11357 pt. 1 and head B11357 pt. 2.
- f. Unsolder the three black leads from the timer switch (Figure 4-7) and remove the timer assembly.

Replacement

- a. Position the new timer assembly in the rear door spider. Run the wires along the spider

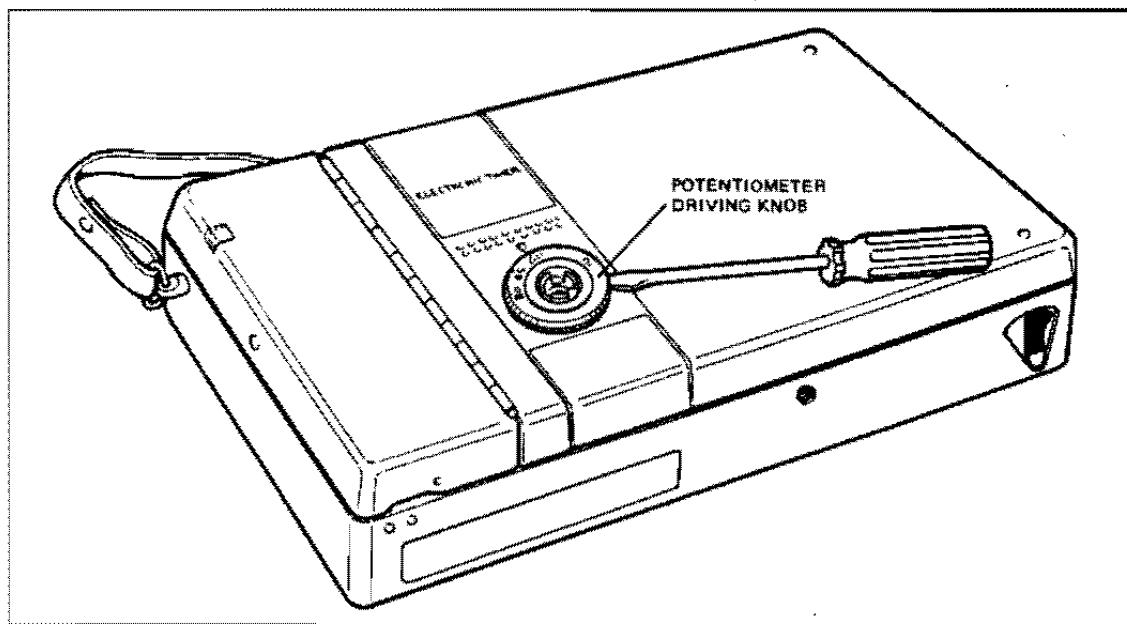


FIG. 4-4 REMOVING THE DRIVING KNOB

- as shown in Figure 4-7 and solder the three leads to the timer switch.
- Secure the rear door to the spider by replacing the four rivets. Use a De-Staco tool with anvil B11357 pt. 3 and head B11357 pt. 4.
 - Solder the black and white leads to the timer (see Figure 4-6).
 - Activate the cement on the electrical name-

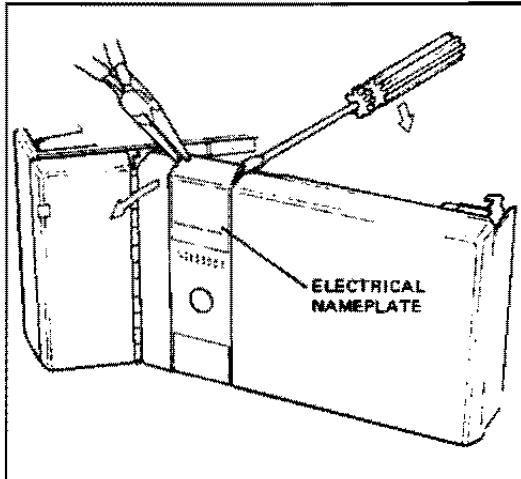


FIG. 4-5 FREEING THE ELECTRICAL NAMEPLATE

plate using M.E.K. (methyl-ethyl-ketone) and secure the nameplate in place on the rear door.

- Adhere the driving knob to the timer potentiometer as follows:

First, if necessary, scrape away any accumulation of cement or melted plastic from the potentiometer using an X-acto knife. Next, place the driving knob over the potentiometer, lining up the tang on the knob with the slot on the potentiometer. Hold the knob in place and open the back door of the camera. Use a #535, 23½w Ungar Soldering Iron (without a tip) to

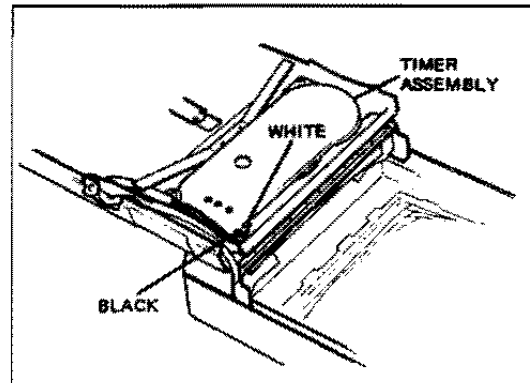


FIG. 4-6 UNSOLDERING THE TIMER LEADS

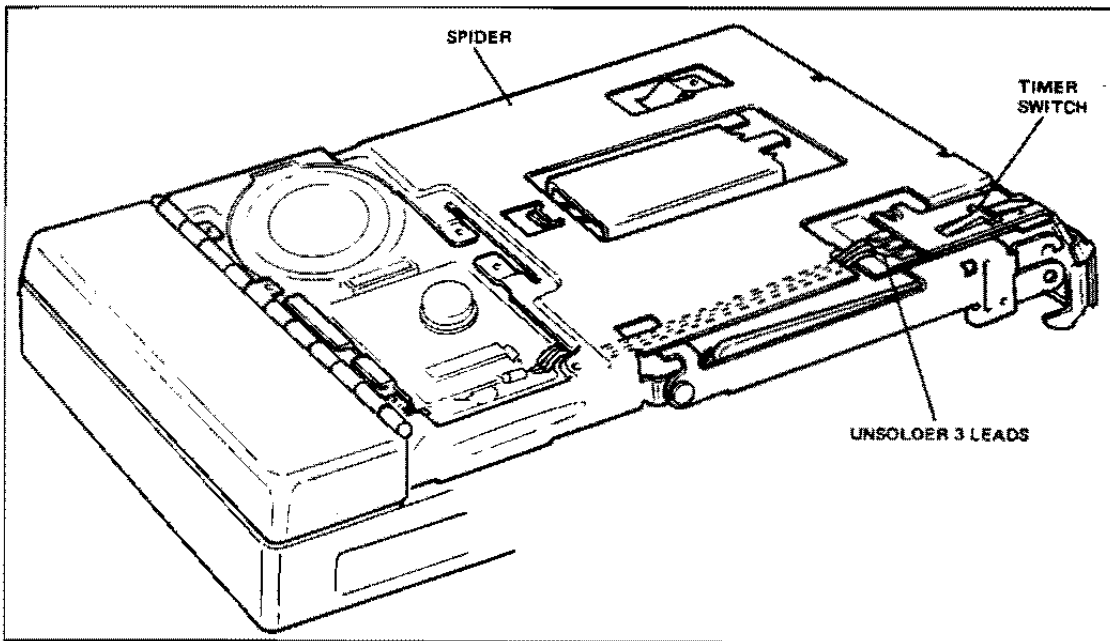


FIG. 4-7 UNSOLDERING THE SWITCH LEADS

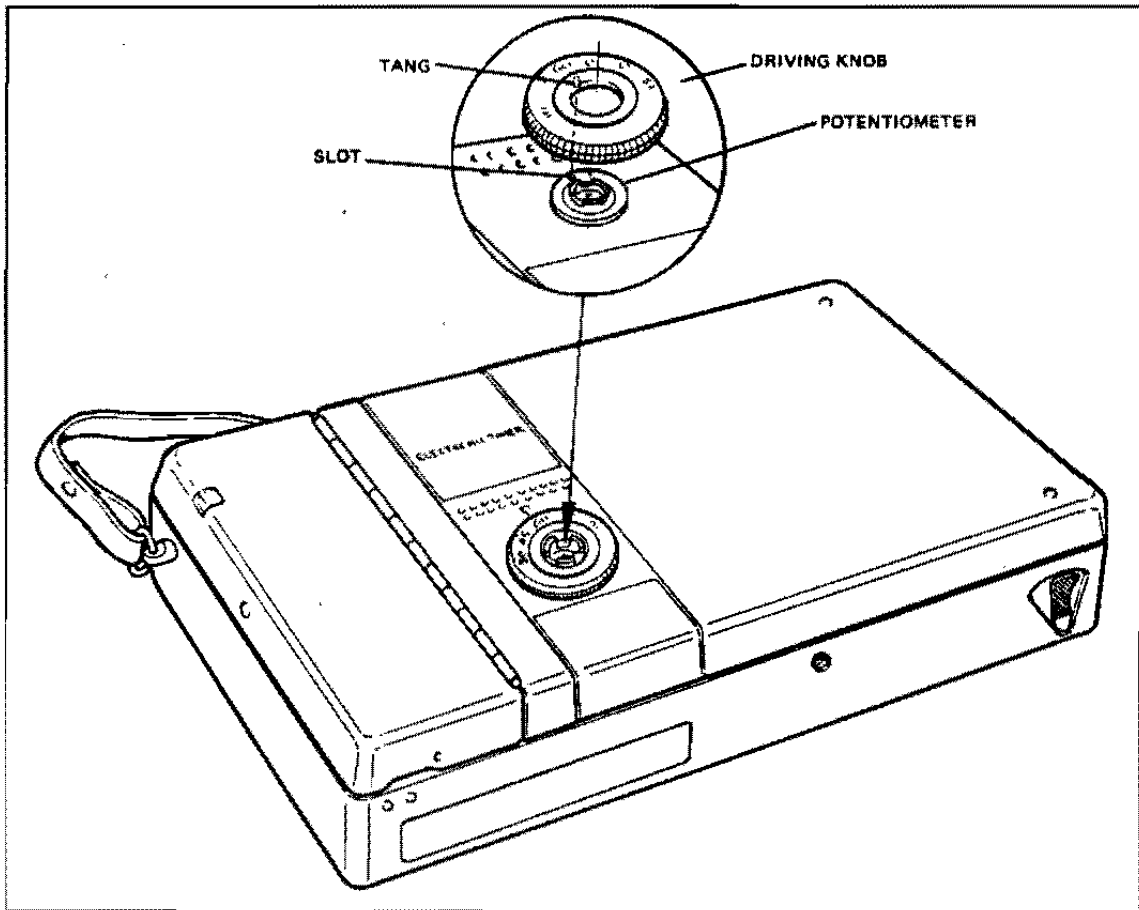


FIG. 4-8 INSTALLING THE NEW KNOB

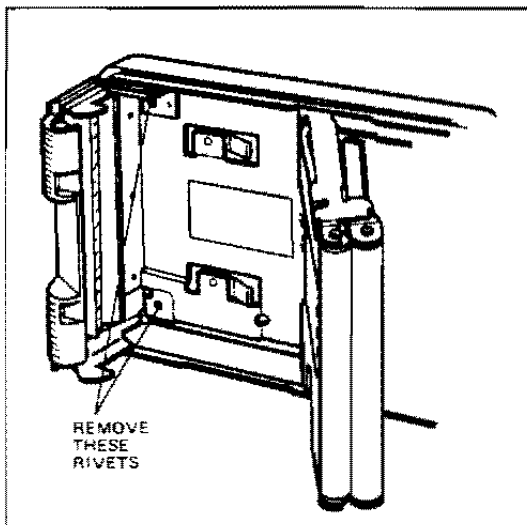


FIG. 4-8A LOCATION OF THE RIVETS

seal the knob onto the potentiometer. Insert the soldering iron into the access hole on the timer body and hold it in place until the knob is securely adhered to the potentiometer. (Figure 4-8).

f. Adhere the black index plate to the driving knob.

2. Timer Switch Continuity Check, Adjustment and Replacement

a. Remove the two rear door rivets (Figure 4-8A) using a De-Staco tool with anvil B11357 (part #1) and head B11357 (part #2). (Save the red roll latch.)

b. Grasp the rear door assembly as shown in figure 4-9, using your forefinger to push

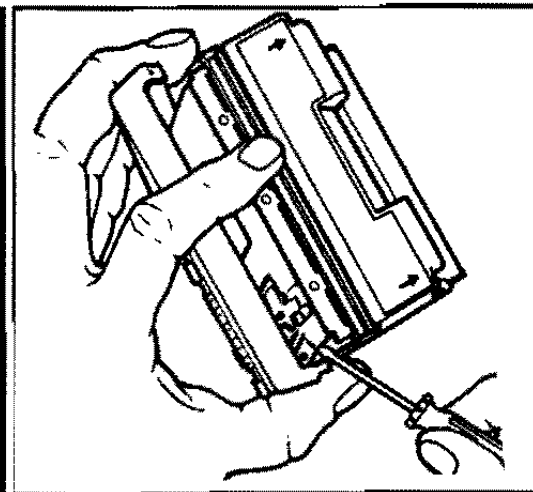


FIG. 4-9 RELEASING THE TIMER SWITCH

the spider away from the door. **DO NOT BEND THE SPIDER TOO FAR.** Pry the timer switch out of its place in the spider and allow it to hang free.

c. Check the timer switch continuity:

1. Set a VOM at the Rx1 scale and place probes on the contacts shown in Figure 4-10. The reading should be INFINITY.

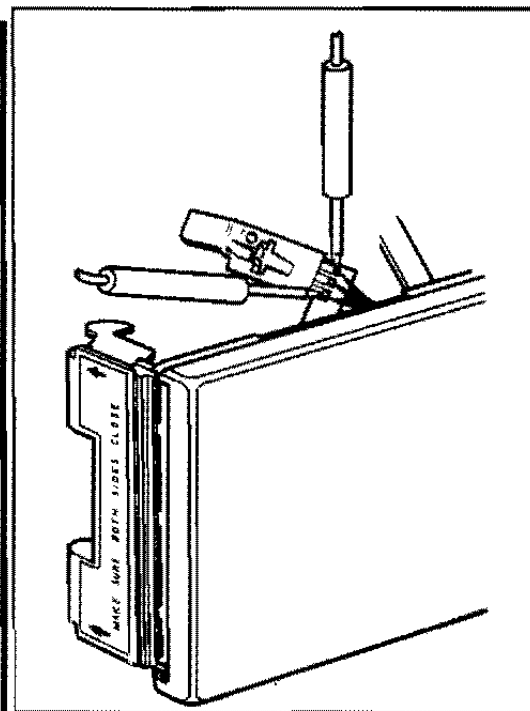


FIG. 4-10 CHECKING THE TIMER SWITCH

If the meter shows a continuity reading, check for bridging of the solder connections between the switch contacts. If none, replace the switch (refer to step d. below).

2. If the reading in step 1 is INFINITY, depress the switch tab. The reading should be zero. If not, check the "T" contact to be sure that both arms are touching the contacts. If either arm is not touching, tweak that arm until it does touch the contact. If the arms are touching the contact and the reading is still INFINITY, spray the arms and contacts with "Hush" (red can) contact cleaner and re-check the reading. If the reading is still not correct, replace the timer switch as follows:

d. Timer Switch Replacement:

Removal

Unsolder the three leads from the timer switch contacts.

Replacement

Solder the three timer leads to the switch contacts using an Unger "Princess" solder iron (or equivalent). Refer to Figure 4-10 for solder points.

- e. Carefully position the timer switch back into the spider, aligning the rivet hole in the switch with the rivet holes in the spider and door. Also be sure that the three plastic ridges on the switch are properly aligned with the three holes in the spider. Manually push back the tab to observe the operation of the switch before securing it.
- f. Position the red roll latch in place and secure the spider to the door with rivets using De-Staco tool with anvil B11257 (part 3) and head B11357 (part 4).

3. Electronic Timer Transducer and Lamp Replacement

- a. Disassemble the timer from the rear door. (Refer to procedure: "Replacing the Electronic Timer" — do not unsolder the two timer leads or remove the two rear door rivets.)

b. Transducer Replacement:

Removal

1. Unsolder the two transducer leads (Figure 4-11).

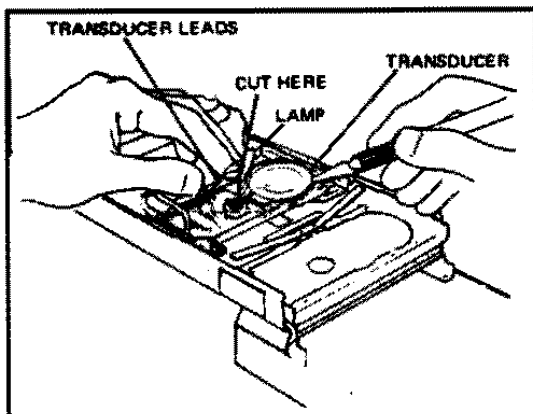


FIG. 4-11 REMOVING THE TRANSDUCER OR LAMP

2. Carefully pry the transducer free of the timer body using an X-act knife with #11 blade (or equivalent) to break the cement seal (see Figure 4-11).

Replacement

1. Apply silicone rubber cement on the new transducer and secure it to the timer body (Figure 4-12).

CAUTION: IF THE TRANSDUCER IS INSTALLED SO THAT IT CONTACTS THE PLASTIC BODY, THE TONE PRODUCED WILL BE TOO LOW.

2. Solder either lead to the white transducer plate. Solder the remaining lead to the brass transducer plate.

c. Lamp Replacement:

Removal

Cut the two black lamp leads (see Figure 4-11).

Replacement

Solder the new lamp leads to the chassis (see Figure 4-12).

- d. Assemble the timer on the rear door. (Refer to procedure: "Replacing the Electronic Timer").

4. Measuring Timer Battery Drain

- a. Open the back door of the camera and release the rollers from their latch to make the timer switch accessible.
- b. Open the battery compartment of the camera. Trip the timer switch and place the probes of a multimeter set at 3 vdc across the terminals of the timer battery

(top battery in the nest) while it is still connected. If the reading is not at least 2.75 volts, replace the battery.

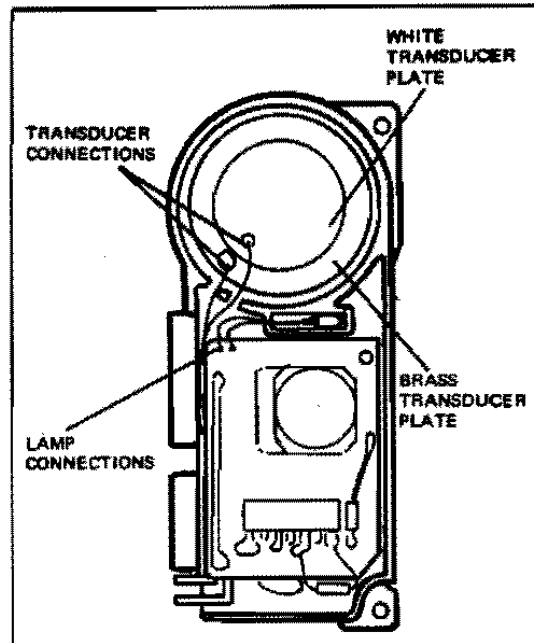


FIG. 4-12 INSTALLING THE TRANSDUCER AND LAMP

- c. Disconnect the positive end of the timer battery from the terminal. Place one probe of a microampere meter on the positive terminal of the battery and the other probe on the terminal receptacle of the cradle as shown in Figure 4-13.

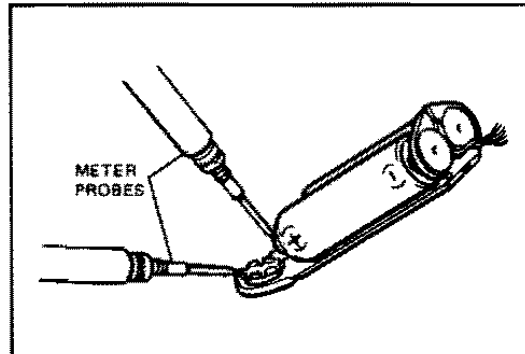


FIG. 4-13 MEASURING TIMER BATTERY DRAIN

- d. If the reading on the meter is less than 10 microamps - reassemble the camera. If the reading is greater than 10 microamps, continue below.

- c. With battery drain in excess of 10 microamps, the timer filter capacitor (Figure 4-14) must be replaced. The manner in

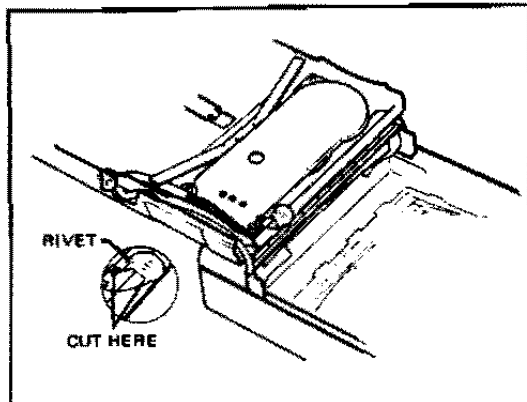


FIG. 4-14 REMOVING THE TIMER FILTER CAPACITOR

which it is removed depends on the following steps:

- Lift the filter capacitor up and very carefully examine the timer contacts. On some cameras, these contacts are internally grounded with a very fine wire running under the spider. If you find that the camera is internally grounded to the positive contact (Figure 4-15 for identification of positive and negative contacts),

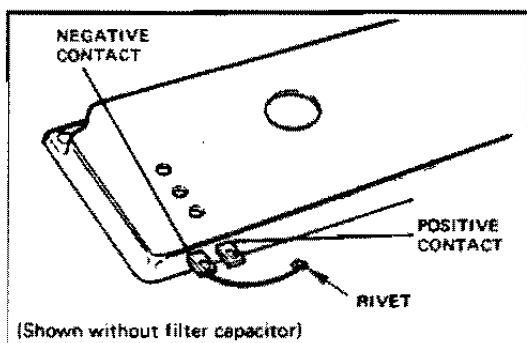


FIG. 4-15 RELOCATING THE LEAD

you must cut the filter capacitor leads flush to the contacts and transfer the internal ground from the positive to the negative contact. If the ground is to the negative contact, also cut the capacitor leads flush to the contacts. In either case, with an internal ground in place on the negative contact, install a new .05 uf, 10 V capacitor and reassemble the camera. If there was no internal ground, cut the capa-

citor leads as shown in Figure 4-14 and continue below.

- f. Scrape the paint off the rivet (which was covered by the capacitor) and clean it thoroughly.
- g. Solder the long lead to the rivet.
- h. Install a new .05 uf, 10V capacitor and re-check the battery drain.
- i. Repaint the affected area using Kodak Brushing Lacquer No. 4 Dull Black.

D. ELECTRONIC FLASH SYSTEM

I. Replacing the Converter Circuit Board

Removal

- a. Remove the rear cover:
 1. Carefully pry one of the hinge plugs free using a jeweler's screwdriver.
 2. Drive the hinge pin and remaining hinge plug free of the hinge using a 1/16" drive
- b. Release the foot assembly from the body (Figure 4-16):

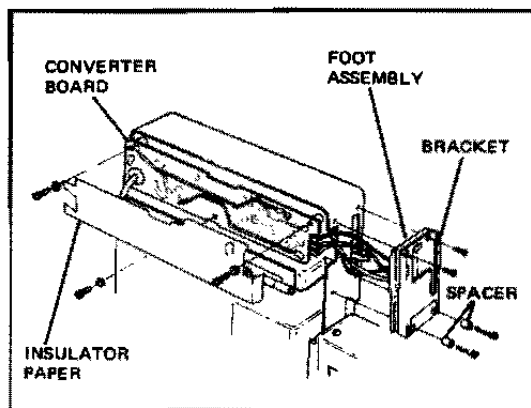


FIG. 4-16 REMOVING THE FOOT ASSEMBLY

1. Remove the four Phillips head retaining screws and the two spacers.
2. Slide the bracket off the foot assembly.
- c. Remove the Phillips head and two pan head retaining screws securing the converter circuit to the body.
- d. Free the timer cable (Figure 4-17) from the converter circuit board by cutting away a corner of the board using a pair of heavy-duty cutters.
- e. Remove the foot assembly from the converter circuit board by unsoldering the violet, brown, black and red leads from the board.

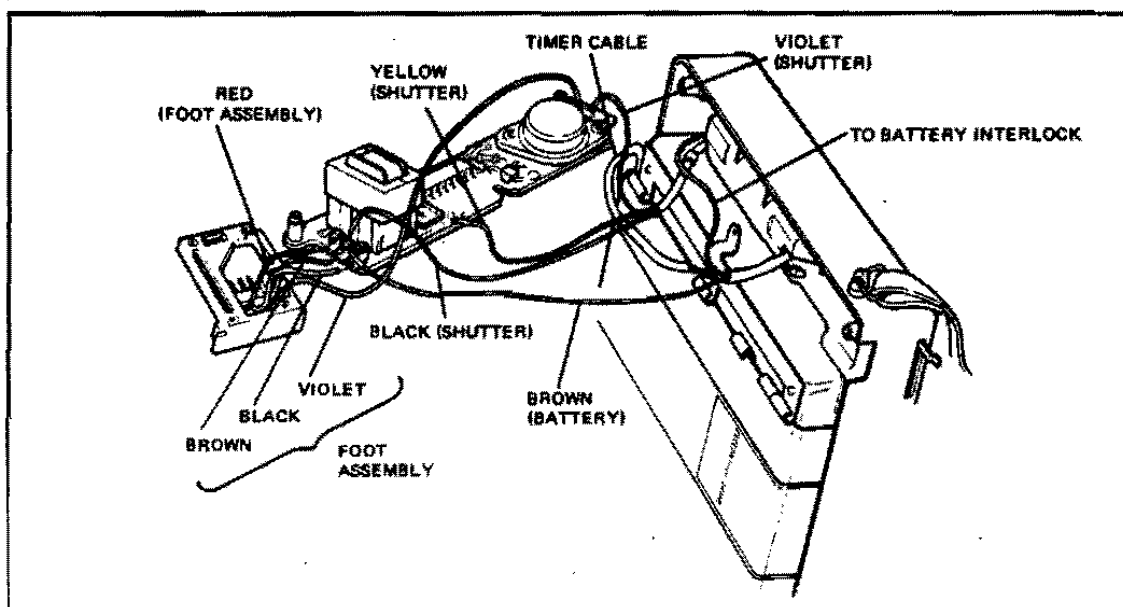


FIG. 4-17 UNSOLDERING CONVERTER LEADS

- f. Unsolder the violet, yellow and black leads running to the shutter.
- g. Unsolder the brown lead running to the battery. Remove the converter circuit board.

Replacement

- a. Assemble the foot assembly to the new converter circuit board by resoldering the violet, brown, black and red leads to the converter circuit board (Figure 4-17).
- b. Solder the brown battery lead to the new converter circuit board.
- c. Solder the violet, yellow and black shutter leads to the new converter circuit board.
- d. Place the timer cable around the chassis in such a manner that it will not bind when the converter board is secured in place.
- e. Assemble the foot assembly to the body: Slide the bracket onto the foot assembly and position the assembly on the body. Fit the spacers in place and secure the assembly with the two black Phillips head screws and the two silver Phillips head screws.
- f. Position the converter board on the body and secure it in place using the two pan head screws and washers, and the Phillips head screw and washer.
- g. Secure the rear cover to the rear door:
 1. Position the insulator paper over the converter board.
 2. Install the rear cover so that the latch catches in the body slot and its hinge is aligned with the rear door hinge.
 3. Secure the two hinges with the hinge pin.
 4. Replace the two hinge plugs.

2. Adjusting the Converter Circuit

- a. Open the converter circuit compartment of the camera by removing the hinge pin from the compartment door.
 - b. Connect the camera and electronic flash (with switch in "ON" position) to the 360 Analyzer, or the 360 Meter Connector Block (refer to Figure 2-7 or Figure 2-8).
 - c. Using a tool which can fit through the access hole on the converter circuit board, adjust the potentiometer so the meter reading falls within the 350 to 365 vdc range. Old style boards have one access hole while newer boards have two. Figure 4-19 shows the access point on both old style and new style converter circuit boards.
- Turning the potentiometer clockwise lowers the voltage while a counterclockwise rotation raises the voltage.

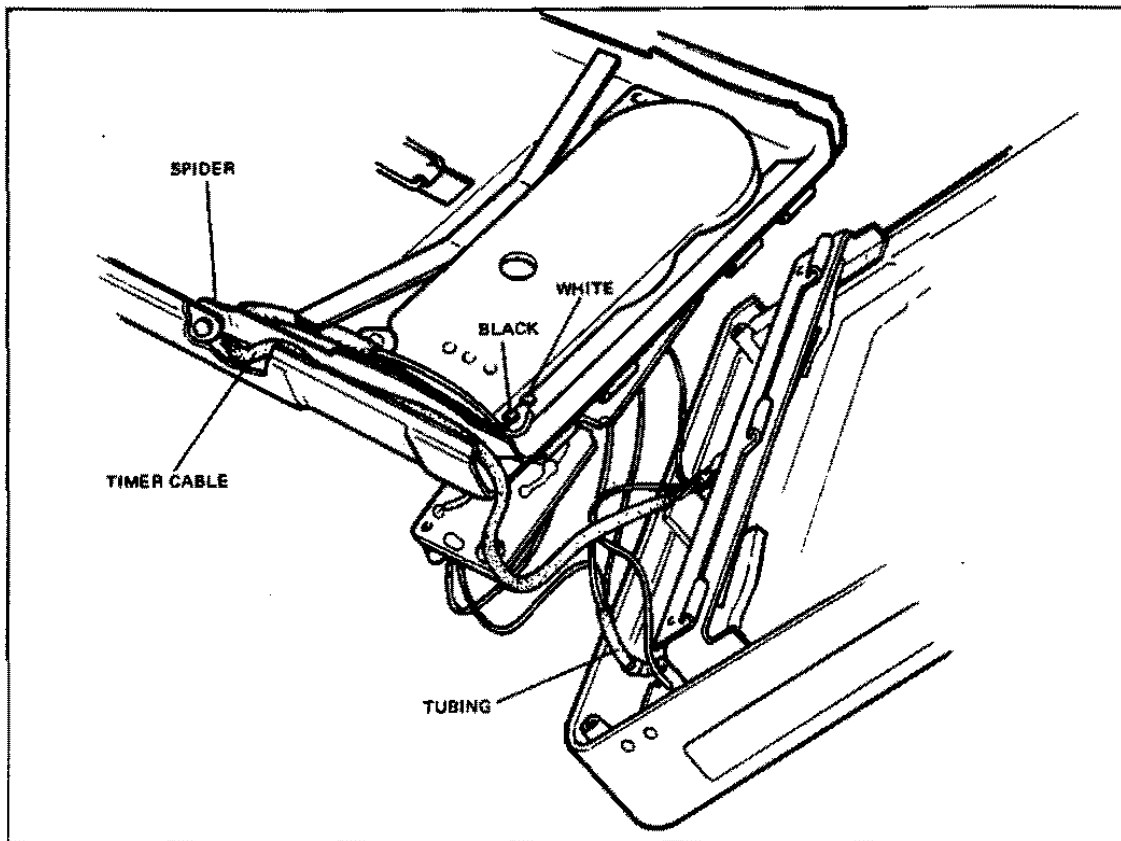


FIG. 4-18 REASSEMBLING THE CONVERTER CIRCUIT

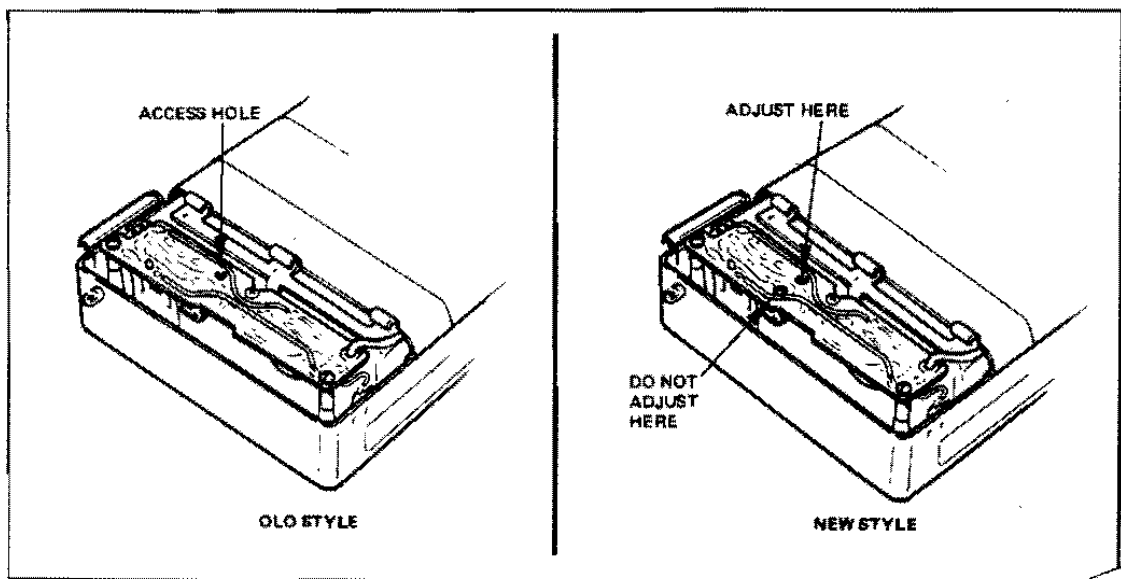


FIG. 4-19 ADJUSTMENT OF OLD AND NEW STYLE CONVERTER

3. Testing the Electronic Flash Dump Switch

- Connect the camera and Electronic Flash (switch in "ON" position) to the 360 Analyzer. Allow the capacitor in the flash to fully charge. ("Capacitor" meter between 320-360 vdc.)
- Disconnect the camera from the analyzer. The "Input Current" meter should fall to zero.
- Pull the electronic flash off the foot assembly on the analyzer. Both the "Capacitor" and "Battery" meters should fall to zero.
- Clip the electronic flash back onto the foot assembly. Only the "Battery" meter indicator should move. If the "Capacitor" meter climbs, the flash safety switch is defective and must be repaired or replaced.

4. Flash Louver Actuator Replacement and Adjustment of the Louvers

Removal

- Place the ON-OFF switch to the OFF position. Remove the bezel using tool CR11342. Insert the tool approximately 1/8" under the bezel on the underside of the flash (Figure 4-20). DO NOT OVER INSERT THE TOOL. Slide the tool (using a lifting motion) along the bezel until the bezel lifts off the housing.

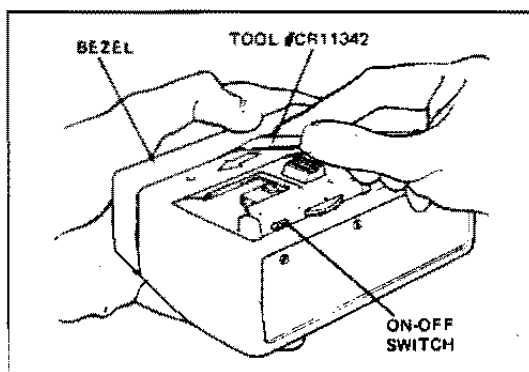


FIG. 4-20 OPENING THE FLASH ASSEMBLY

- Remove the louvers using tool CR11342 (Figure 4-21). Place your finger over the louver and snap the pivot out of the holder. Remove all ten louvers in this manner.
- Remove the two Phillips head screws at the front of the flash.
- Remove the long Phillips head screw from the underside of the flash.

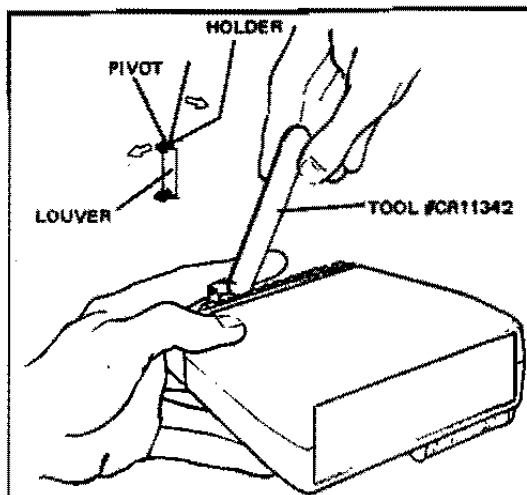


FIG. 4-21 REMOVING THE LOUVERS

- Remove the instruction plate by prying-up one edge using tweezers and peeling it free (Figure 4-22).

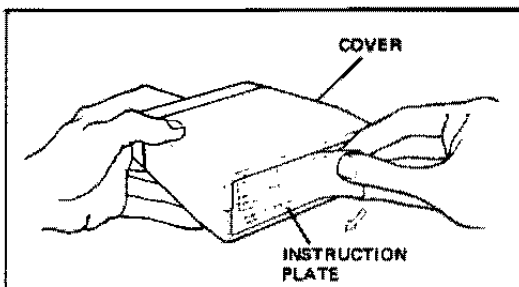


FIG. 4-22 PEELING OFF THE ETCH PLATE

- Remove the two Phillips head screws from the back of the flash and remove the cover.

WARNING: Upon removing the cover, ensure that the capacitor is fully discharged using a 250 ohm resistor.

- Note the manner in which the capacitor, battery, reflector assembly, insulator paper, and white foam pad are installed and then lift them out of the housing. Use care not to disconnect the electrical leads. Unhook the spring from the actuator bar and remove the bar (Figure 4-23).

Replacement

- Position the new actuator bar in the housing and hook the spring in the bar (see Figure 4-23).
- Replace the louvers. Turn the "Darken-Lighten" wheel and check the action of the

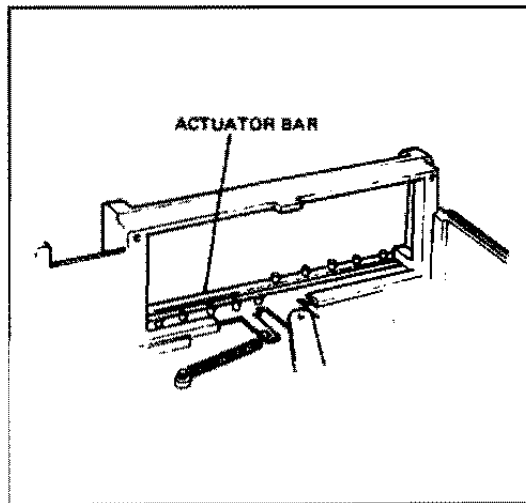


FIG. 4-23 REMOVING THE ACTUATOR BAR

louvers (Figure 4-24). If the louvers do not function properly, adjust as follows:

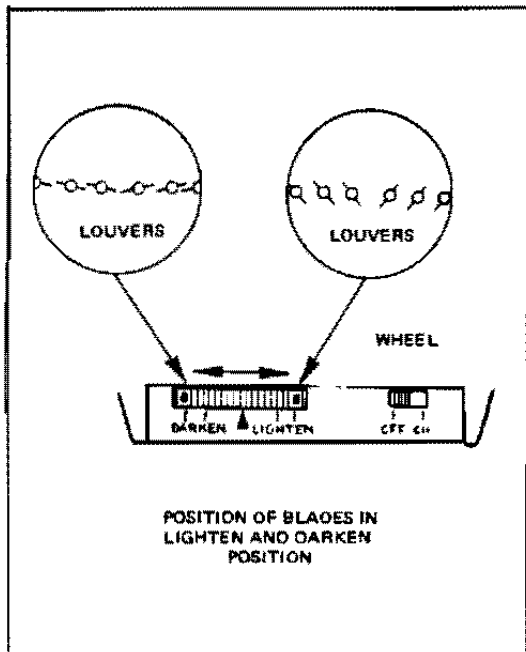


FIG. 4-24 REINSTALLING THE LOUVERS

Louver Adjustment

1. Turn the "Darken-Lighten" wheel to full LIGHTEN. Fit the tabs of tool CR11343 in the slots of the locknut and rotate the tool counterclockwise until the locknut is loose (Figure 4-25).

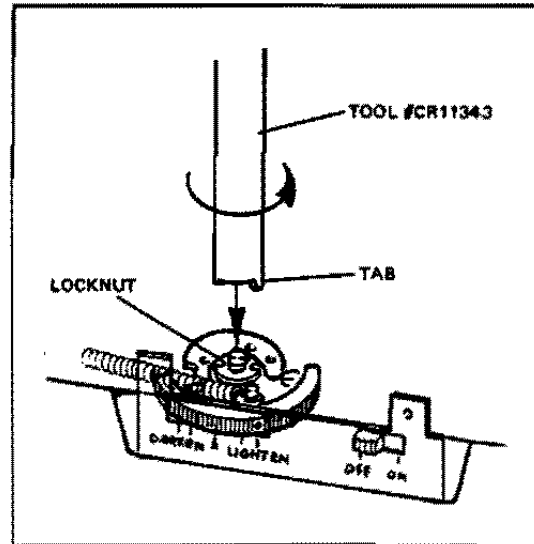


FIG. 4-25 LOOSENING THE ADJUSTMENT NUT

2. Insert a 1/16" drive pin punch (or equivalent) in a zero adjust cam slot and rotate the cam clockwise until the louvers are almost fully closed (Figure 4-26). Remove the punch.

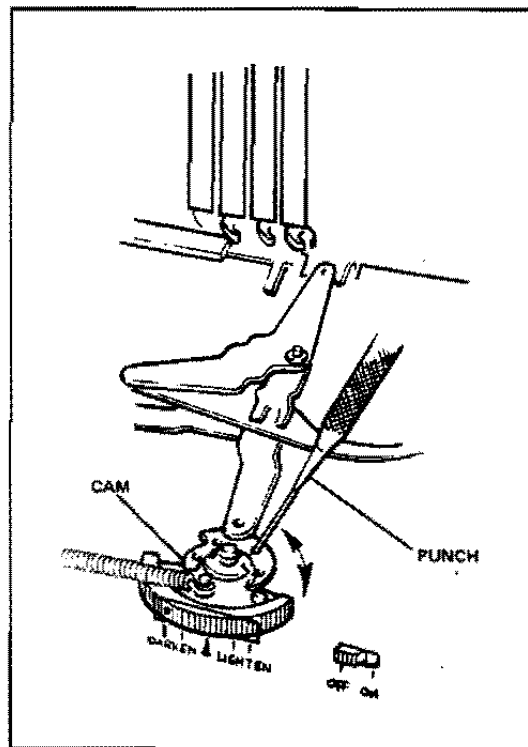


FIG. 4-26 ADJUSTING THE LOUVERS

3. Align the white dot on the "Darken-Lighten" wheel with the extreme DARKEN crossline and tighten the locknut using tool CR11343 (Figure 4-27).

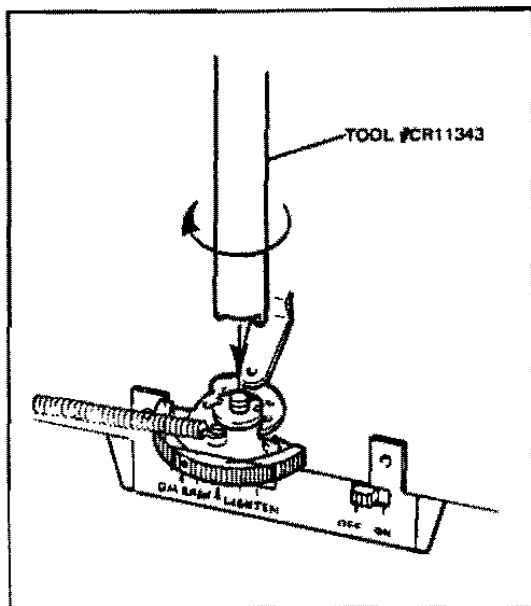


FIG. 4-27 TIGHTENING THE ADJUSTMENT NUT

4. Turn the "Darken-Lighten" wheel and check the action of the louvers. Refer to Figure 4-24.
 - c. Replace the reflector assembly, insulator paper, battery, capacitor and white foam pad in the housing. Position the cover on the housing and replace the long Phillips head screw.
 - d. Replace the two Phillips head screws at the back of the flash and adhere the instruction plate in place on the cover.
 - e. Replace the two Phillips head screws to the front of the flash.
 - f. Replace the bezel. Be sure it is not installed upside down.
5. Flash Modification
- a. Open the flash assembly as instructed previously.
 - b. Unsolder the ends of the flashtube from the contacts on the printed circuit board.
 - c. Unsolder the yellow trigger coil lead from the flashtube trigger lead.
 - d. Remove the reflector and flashtube from the printed circuit board. (It may be nec-

essary to loosen the legs of the reflector with a soldering iron.)

- e. Unsolder, remove and discard the trigger capacitor.
- f. Install a new .068 uf capacitor in place of the old trigger capacitor.
- g. Install a new reflector and flashtube assembly onto the printed circuit board. (Be sure it is installed so that the flashtube trigger lead exits from the reflector on the same side as the trigger coil.)
- h. Solder the ends of the flashtube to the contacts on the printed circuit board.
- i. Install the proper size insulation over the yellow trigger coil lead and the flashtube trigger lead. Push the flashtube trigger lead insulation down as far as it will go.
- j. Solder the flashtube trigger lead to the yellow trigger coil lead. Slide the insulation over the air splice. (If the trigger coil has to be replaced, use a new style sector coil, #223937.)
- k. Position the piece of new mylar insulation between the reflector and the components on the printed circuit board. (Be sure the new trigger capacitor is not touching the resistor.)
- l. Apply a very small amount of RTV to the end of the flashtube nearest the trigger coil and between the new trigger capacitor and the trigger coil.
- m. Re-assemble the flash assembly as instructed previously.

6. Installation of Insulators on Flash Connectors

Some flash assemblies are missing the insulators which protect the wires leading to the connector. Examine the flash connectors as shown in Figure 4-27A. Push down on the red button and look for the insulator under the aluminum cover. (The illustration shows that the shape of the cover on newer flashes is different from that of early models.) Some connectors have light blue paper insulators while other connectors have milky white mylar insulators. If the connector has no insulator, install one as follows:

- a. Place a mylar insulator in the special jig as shown in Figure 27B. Push it down to form a new bend in the insulator. This bend makes it much easier to insert the insulator in its final position.

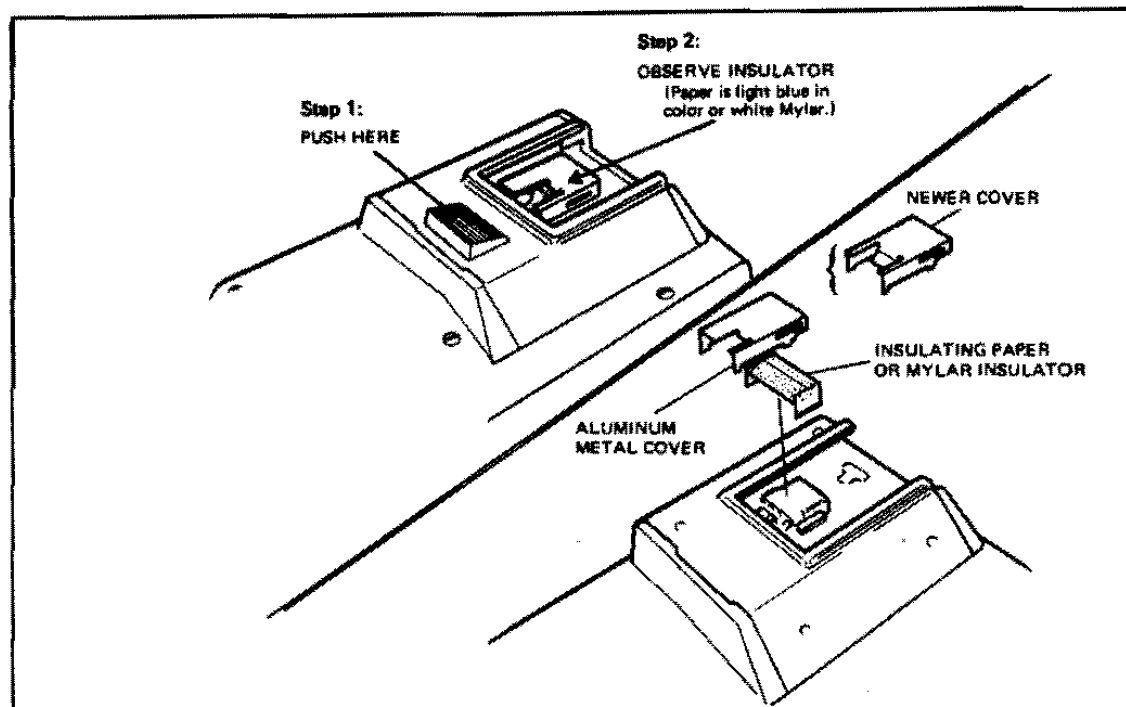


FIG. 4-27A

- b. Position the insulator in the connector with the original bent section pointed down, toward the flash (Figure 27-C).
- c. Using the insertion tool, push the insulator into the connector. Push in all the way, until the step in the tool hits the aluminum cover.
- d. Push down the red button and check to see that the mylar insulator is positioned over the wires as shown in Figure 27D. On the newer covers, you will be able to see the two ends of the insulator without pushing down the red button.

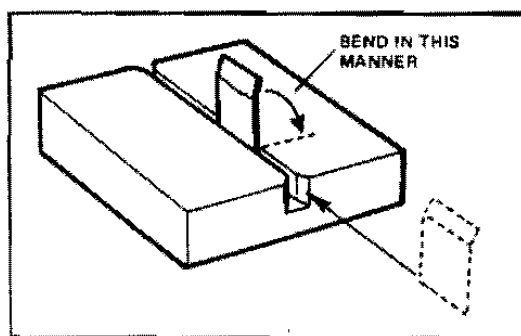


FIG. 4-27B BENDING THE INSULATOR

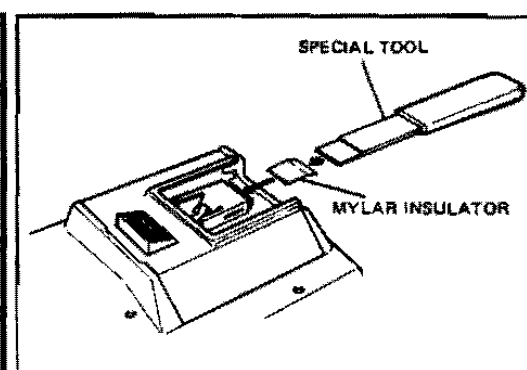


FIG. 4-27C INSTALLING THE INSULATOR

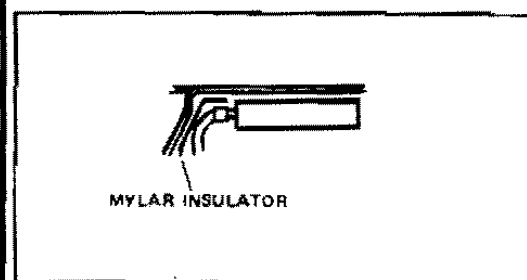


FIG. 4-27D FINAL CONFIGURATION

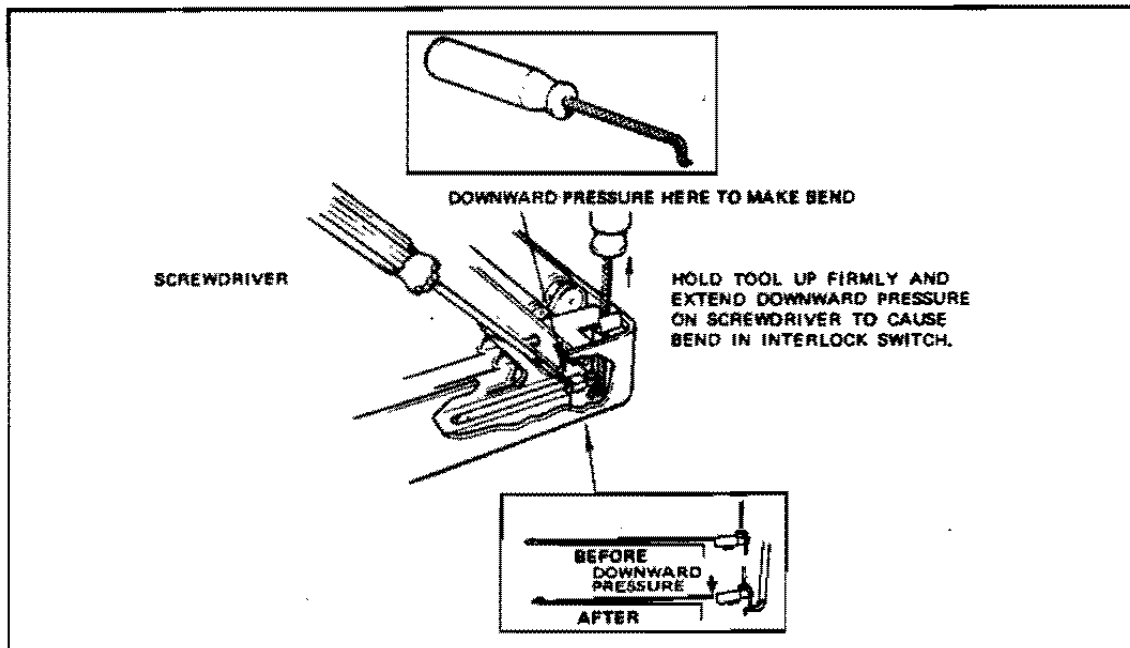


FIG. 4-28 ADJUSTING THE BATTERY INTERLOCK SWITCH

E. MISCELLANEOUS CAMERA REPAIRS

1. Adjusting the Battery Interlock Switch

- Remove the battery compartment cover from the camera.
- Position the tweaking tool in the access hole, sliding the end of the tool under the interlock switch as shown in Figure 4-28.
- While pulling up on the interlock switch with the tweaking tool, use a screwdriver to exert a downward pressure at the switch's neck. This will bend the switch allowing it to make better contact.

2. Replacing the Battery Compartment

Removal

- Remove the left hand guard and move the focus bar to extreme close-up.
- Remove the batteries.
- Remove the two Phillips head screws holding the battery compartment to the body (Figure 4-29).
- Remove the rear cover:
 - Carefully pry one of the hinge plugs free using a jeweler's screwdriver.
 - Drive the hinge pin and remaining plug free of the hinge using a 1/16" drive pin

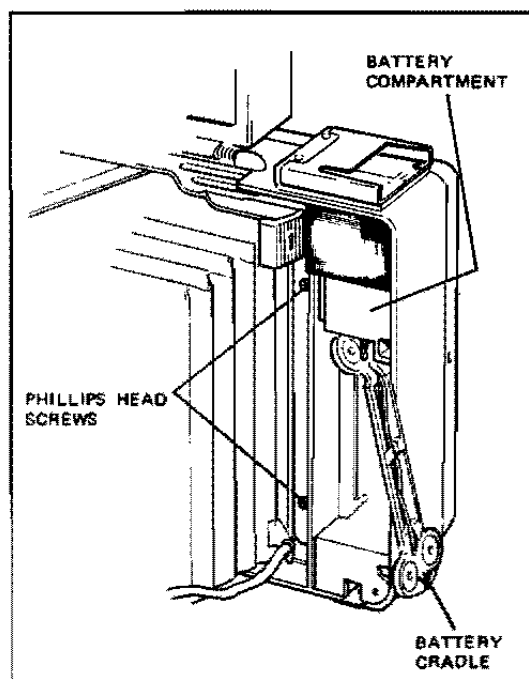


FIG. 4-29 RELEASING THE BATTERY COMPARTMENT

punch. Remove the rear cover and insulator paper.

- e. Remove the two pan head retaining screws and washers from the converter board (Figure 4-30), releasing the battery compartment.

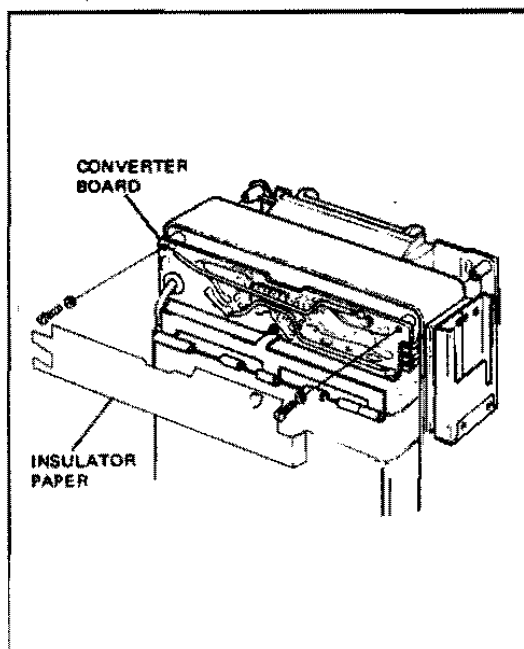


FIG. 4-30 LOCATION OF RETAINING SCREWS

- f. Cut the white lead (at the eyelet) running to the battery interlock contact (Figure 4-31).
- g. Release the shutter cable and battery cable from the battery compartment feed-thru holes by carefully snipping the plastic using cutters (see Figure 4-31). Slide the battery cradle through the opening in the battery compartment and remove the battery compartment.

Replacement

- a. Carefully snip away the plastic from the cable feed-thru holes in the new battery compartment so that the cables can be inserted (see Figure 4-31).
- b. Slide the battery cradle through the opening in the battery compartment and solder the white lead to the battery interlock contact eyelet. Insert the shutter cable and battery cable in the battery compartment.
- c. Secure the battery compartment to the converter board using the two pan head retaining screws and washers.

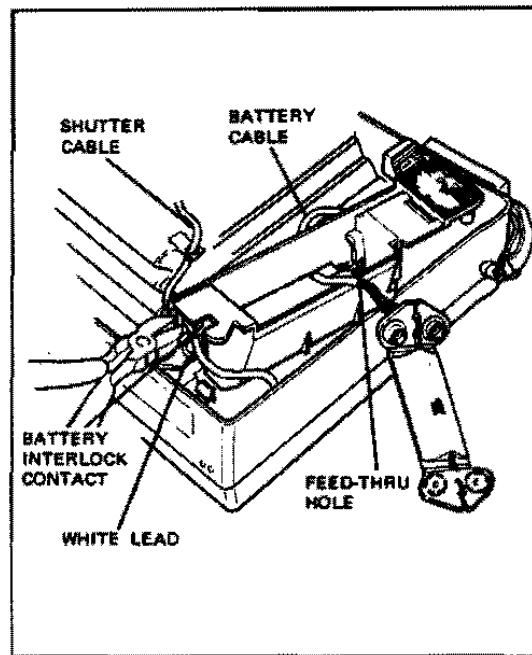


FIG. 4-31 CUTTING THE BATTERY COMPARTMENT

- d. Secure the rear cover to the rear door:
 1. Position the insulator paper over the converter board and install the rear cover so that the latch catches in the body slot and the hinge is aligned with the rear door hinge.
 2. Insert the hinge pin in the hinges and replace the two hinge plugs.
- e. Secure the battery compartment to the body using the two Phillips head screws.
- f. Replace the batteries.
- g. Replace the left hand guard.

3. Replacing the Battery Cradle

Removal

- a. Remove the left hand guard.
- b. Remove the batteries.
- c. Remove the rear cover:
 1. Carefully pry one of the hinge plugs free using a jeweler's screwdriver.
 2. Drive the hinge pin and remaining plug free of the hinge using a 1/16th inch drive pin punch. Remove the rear cover and insulator paper.

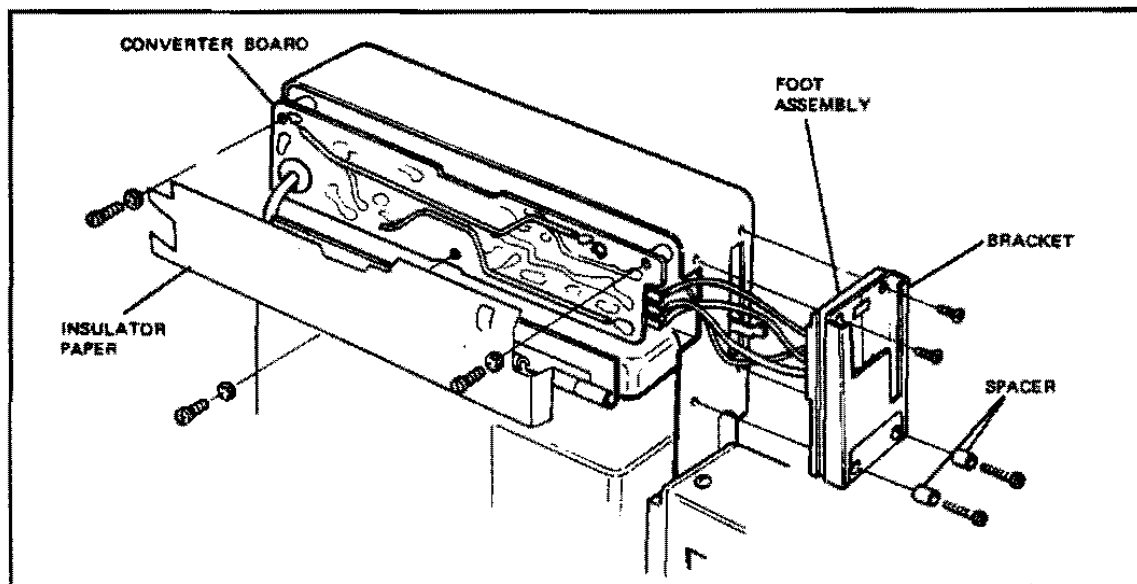


FIG. 4-32 REMOVING THE FOOT ASSEMBLY

- d. Remove the foot assembly from the body (Figure 4-32) by removing the four Phillips head retaining screws and two spacers. Slide the bracket off the foot assembly.
- e. Remove the Phillips head and two pan head retaining screws securing the converter board to the body.
- f. Unsolder the black and white leads from the timer (Figure 4-33) and draw the timer cable through the converter board eyelet. Remove the tubing from the cable and save for reuse.
- g. Unsolder the brown lead running to the converter board (Figure 4-34).
- h. Cut the white lead (at the eyelet) running to the battery interlock contact (Figure 4-34).
- i. Cut the heat shrink tubing from the battery cable and remove the gold banding clip. Remove the battery cradle.

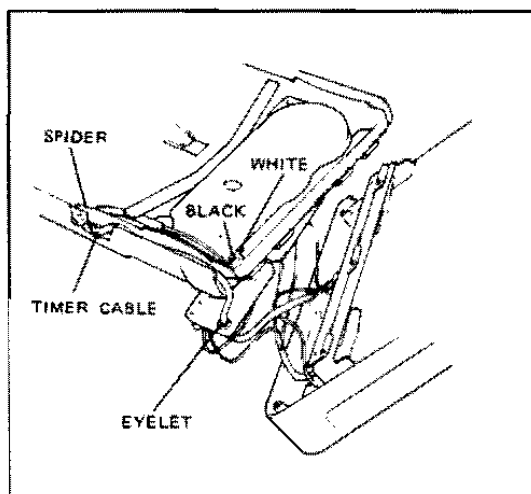


FIG. 4-33 RELEASING THE TIMER LEADS

Replacement

- a. Insert the new battery cable through the battery compartment feed-thru hole. Replace the banding clip on the cable and heat-shrink a piece of tubing (Alpha FIT 105-3/16" black or equivalent) over the clip.
- b. Slide the tubing on the timer wires and run the cable around the converter board. Run the cable through the rear door spider and solder the black and white leads to the timer (Figure 4-33).
- c. Solder the brown lead to the converter board (Figure 4-34).
- d. Solder the white lead to the battery interlock contact eyelet (Figure 4-34).
- e. Assemble the foot assembly to the body: Slide the bracket on the foot assembly and position the assembly on the body. Fit the spacers in the foot assembly and replace

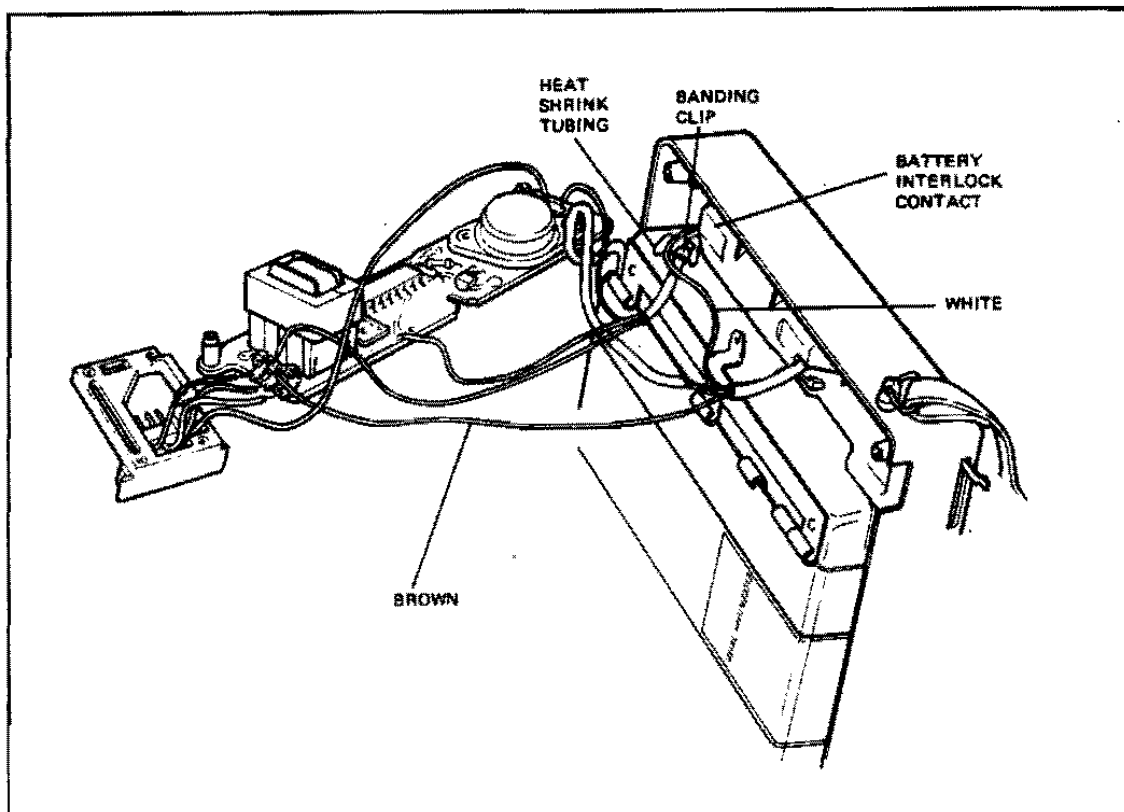


FIG. 4-34 RELEASING THE BATTERY INTERLOCK LEAD

- the four Phillips head screws.
- f. Position the converter board in the body and secure it in place using the three screws and washers.
- g. Secure the rear cover to the rear door:
 - 1. Position the insulator paper over the converter board and install the rear

- cover so that the latch catches in the body slot and the hinge is aligned with the rear door hinge.
- 2. Insert the hinge pin in the hinges and replace the two hinge plugs.
- h. Replace the batteries.
- i. Replace the left hand guard.

SECTION 5 - PARTS IDENTIFICATION

The exploded views in this section are used to identify those parts which are available for replacement. To find a particular part number, turn to the appropriate illustration and locate the key number of the part. The proper name and number of that part can then be found beside the key number in the parts list.

Component parts of an assembly (which are individually available) are indented immediately below the assembly in the parts list. For example:

KEY NO.	PART NAME	PART NUMBER	SUGG. LIST PRICE
1	Shutter Front Casting Assembly	223823	14.00
2	Front Decorative Plate	250729	.20
3	Bezel Assembly	204408	1.10
4	Center Ring	149809	.13
5	Outer Ring	149810	.35

To order parts:

Give PART NUMBER, Full PART NAME, and QUANTITY desired.

Give exact shipping instructions and your complete shipping address.

Address all parts orders to:

Polaroid Corporation
Camera Parts Department
89 Second Avenue
Waltham, Massachusetts 02154

Prices F.O.B. Waltham, Massachusetts

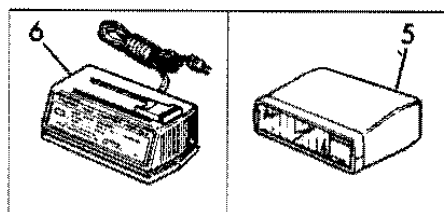
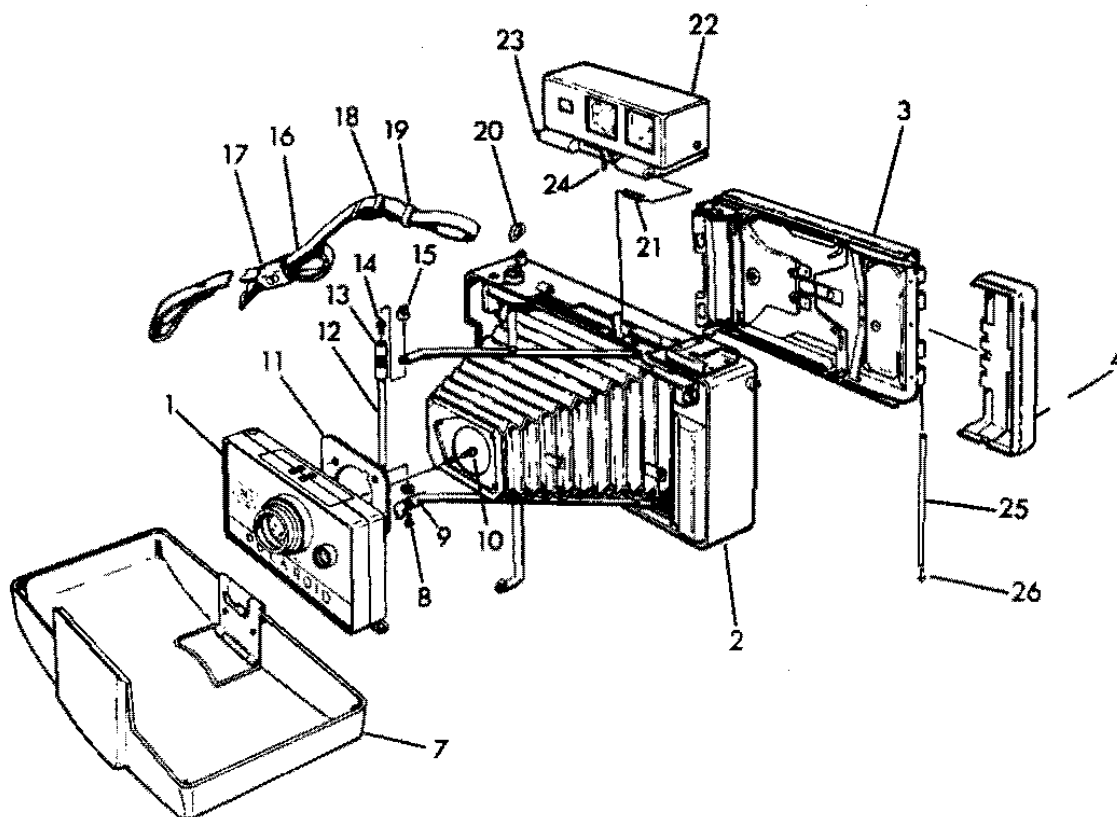
Terms (to accredited accounts): Net 30 days.

Merchandise returns accepted only upon written authorization by Polaroid Corporation.

This price schedule supersedes all previous price schedules.

Prices are subject to change without notice.

PICTORIAL INDEX & COMMON HARDWARE



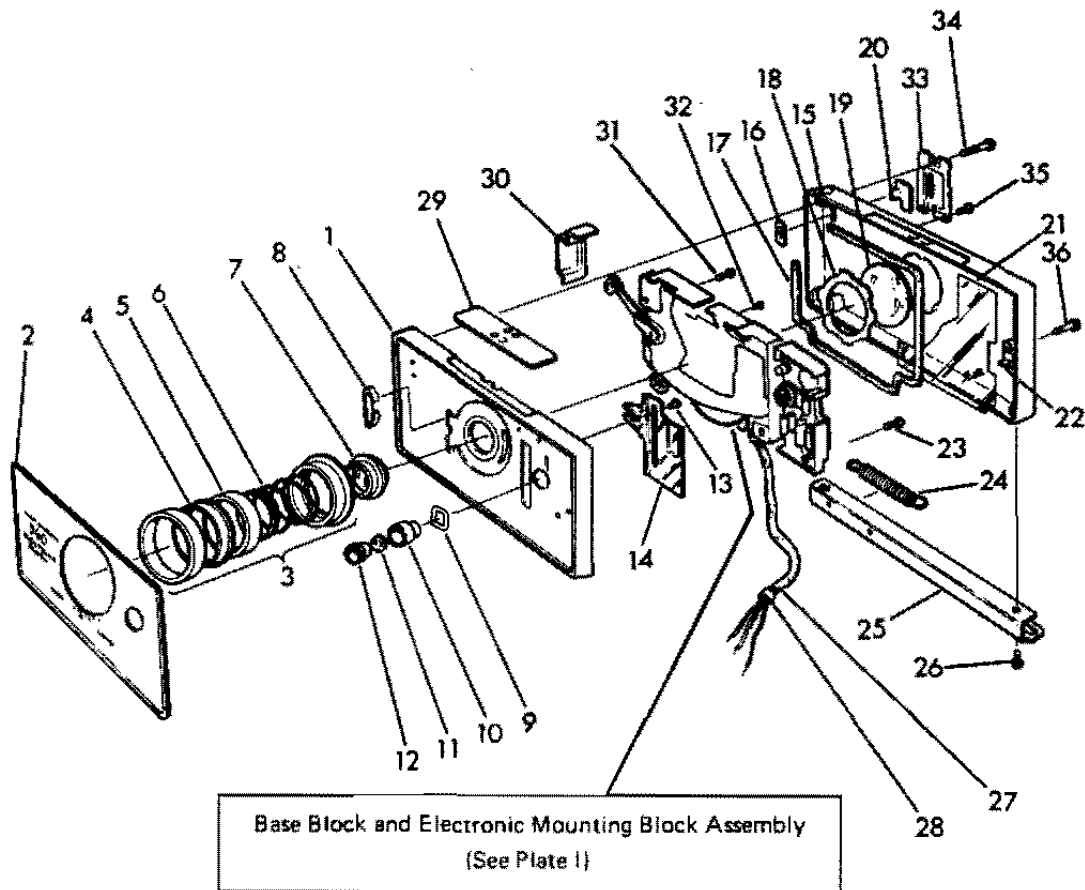
PICTORIAL INDEX

Key No.	Part Name	Plate
1	Shutter Assembly	B
2	Body/Bellows Assembly	C & D
3	Rear Door Assembly	E
4	Rear Cover Assembly	E
5	Electronic Flash Assembly	F
6	Fast Charger Assembly	G
7	Front Cover Assembly	H

PARTS LIST A COMMON HARDWARE

Key No.	Part Name	Part Number
8	Screw, Shutter Shaft	149570
9	Bowed Washer	160442
10	Screw, Bellows (4)	220968
11	Bellows Front Frame Light Seal	179731
12	Shutter Shaft	168098
13	Shutter Shaft Sleeve	168099
14	Detent Stud	160473
15	Detent	157949
16	Neck Strap Assembly	163016
17	Band	160573
18	Tension Slide	157824
19	Keeper	157821
20	"D" Ring (2)	160455
21	Spring, R. F. Body	149528
22	Rangefinder-Viewfinder Assembly	181540
23	Hinge Pin (right)	149542
24	Hinge Pin (left)	149543
25	Hinge Pin, Rear Door	149526
26	Hinge Plug (2)	157887

SHUTTER ASSEMBLY



PARTS LIST B

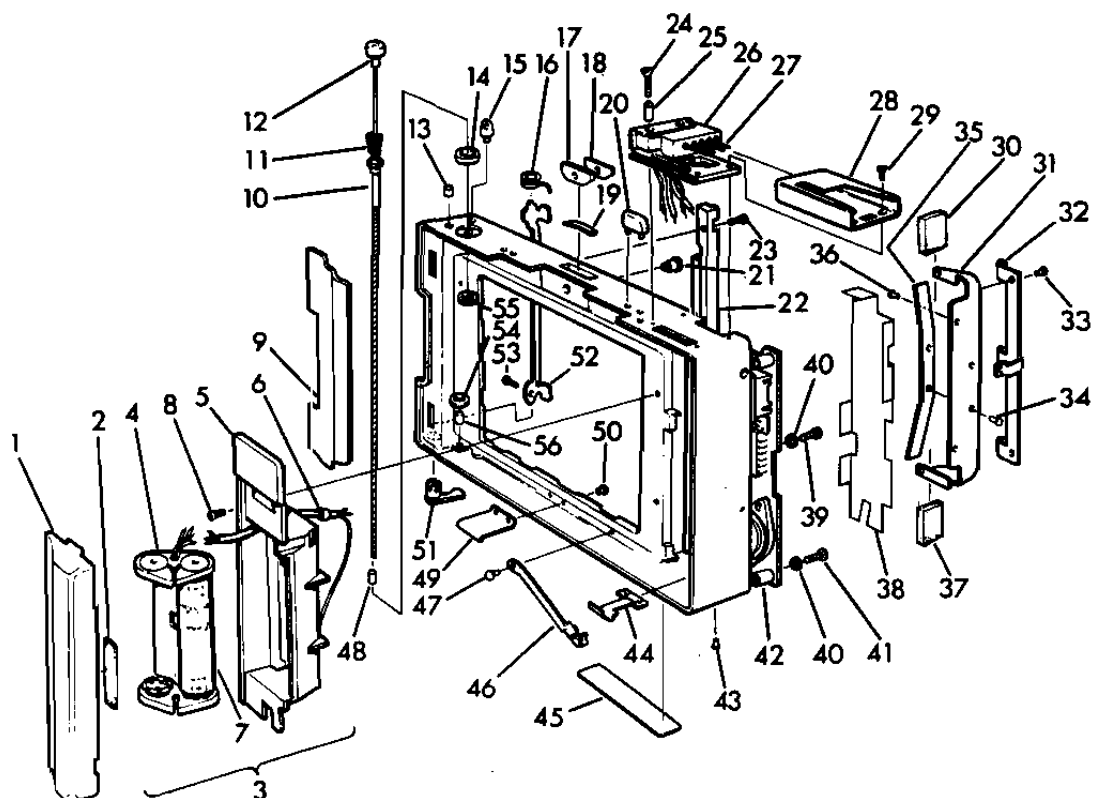
Key No.	Part Name	Part Number
	Shutter Assembly-complete (includes Base Block & Electronic Mtg. Block)	223906
1	Shutter Front Casting Assembly	223823
2	Front Decorative Plate	250729
3	Bezel Assembly	204408
4	Center Ring	149809
5	Outer Ring	149810
6	Bezel Spring	149813
7	Front Lens Mount Assembly	155235
8	Bezel Friction Spring	152525
9	Wave Washer	155179
10	Cell Lens Mount	154856
11	Cell Lens	154071
12	Cell Lens Retainer	154857
13	Rivet, Cell Wedge (2)	149838
14	Cell Wedge	220796
15	Shutter Rear Casting Assembly	223824
16	Release Block Retainer	152521
17	Shutter Gasket	155331
18	"C" Lens Retainer	154046
19	Lens, Rear Positive	155242
20	Shutter Release Block	146722
21	Elec. Mtg. Board Insulator	157939
22	Dowel Pin (2)	149821
23	Screw, Module Mounting (2)	149817
24	Spring, Shutter Mount	172320
25	Shutter Mount	252403
26	Screw, Shutter Mount	149538
27	Battery Wire Assembly	222448
28	Banding Clip	130501
29	Top Etch Plate	250552
30	Front Casting Light Seal	163301
31	Screw, Base Block Mtg. (long)	149865
32	Screw, Base Block Mtg. (short)	157866
33	Cable Release Cover	149740
34	Screw, Shutter Fstg. (long)	149822
35	Screw, Release Cover (2)	154870
36	Screw, Shutter Fstg. (short) (2)	149828

PLATE

C

BODY/BELLOWS ASSEMBLY

(SEE PLATE D FOR REMAINING PARTS)



PARTS LIST C

Key No.	Part Name	Part Number
	Body/Bellows Assembly (includes Key No's. 1 to 91 except those with asterisks)	223830
*1	Left-Hand Guard	252164
*2	Battery Pad	224508
*3	Battery Compartment Assembly	251330
*4	Battery Cradle Assembly	252463
*5	Battery Compartment	252165
*6	Banding Clip	130501
*7	Battery (2)	163081
*8	Screw, Battery Compartment (2)	250174
*9	Right-Hand Guard	146750

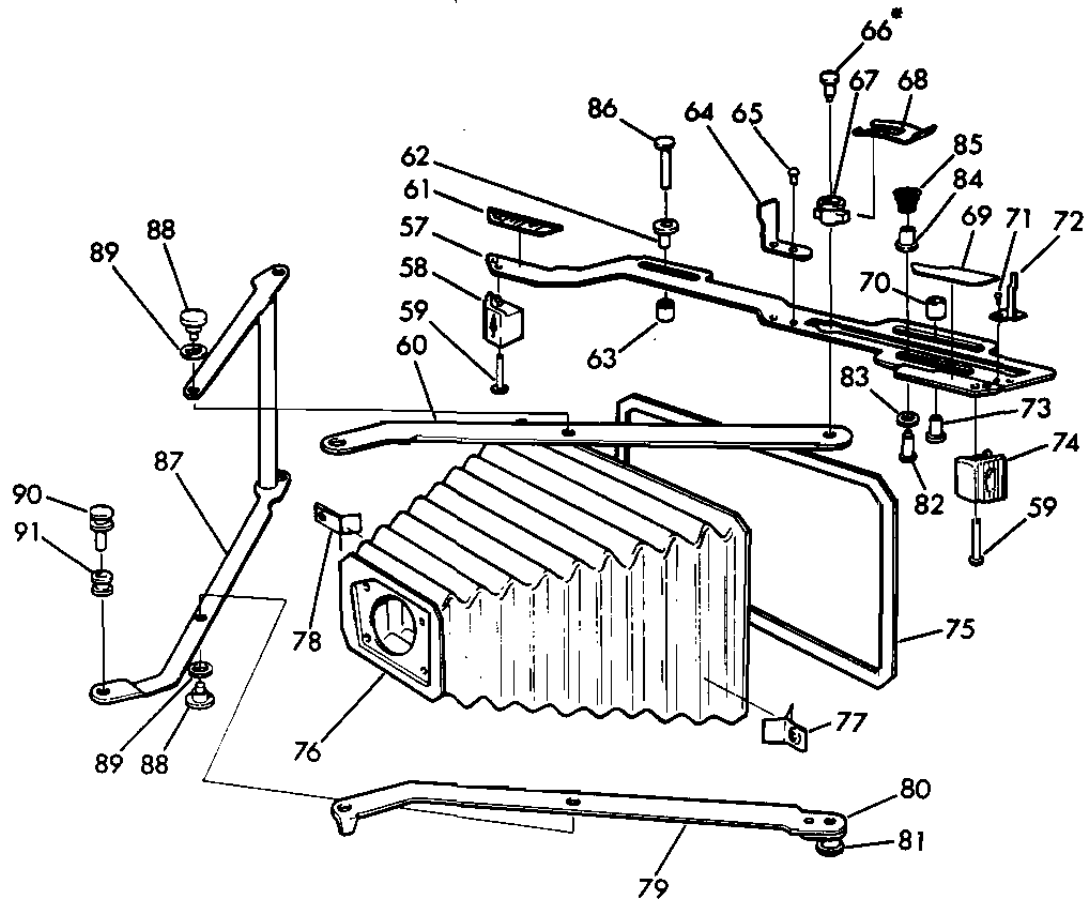
PARTS LIST C (cont'd.)

Key No.	Part Name	Part Number
10	Shutter Release Bushing Assembly	155117
*11	Return Spring	149551
*12	Shutter Release Knob	146689
13	Latch Pivot	157899
14	Bezel, Shutter Release	153234
15	Strap Lug (2)	157804
16	Spring, Release Latch	160416
17	Magnet	188090
18	Pole Piece (2)	188089
19	Magnet Spring	195194
20	R. F. - V. F. Pivot Pad (2)	149710
21	Magnet Pivot (eccentric)	185640
22	Tab Strip Bar	163085
23	Screw, Tab Strip Bar (2)	160465
*24	Screw, Foot (2) - Rear	224434
*25	Spacer, Foot Screw (2)	251698
*26	Foot Assembly	223832
*27		
*28	Foot Body	220179
*29	Screw, Foot (2) - Front	250173
30	Filler (left)	157915
31	Light Seal Assembly	223907
32	Stationary Hinge	222549
33	Rivet, Stationary Hinge (3)	121741
34	Rivet, Spring Stop (2)	76121
35	Spring Stop	149520
36	Rivet, Light Seal (4)	76175
37	Filler (right)	157916
*38	Insulator Paper	252961
*39	Screw, Mounting (Phillips head)	250182
*40	Washer (3)	250183
*41	Screw, Mounting (2) (slot head)	223905
*42	Converter Circuit Board Assembly	222953
43	Rivet, Handguard Latch (2)	103191
44	Handguard Latch	252962
*45	Slot Cover	149556
46	Battery Interlock Assembly	255105
47	Rivet, Spring Contact	157877
*48	Shutter Release Tip	155106
49	Mounting Plate Spring	157923
50	Rivet, Mounting Plate (2)	121741
51	Release Arm	149610
52	Release Latch	146674
53	Screw, Release Arm	121180
54	Spacer, Outer Frame (bottom)	153235
55	Spacer, Outer Frame (top)	149554
56	Pivot Pin, Outer Frame (bottom)	149553

*Not shipped with Body/Bellows Assembly

BODY/BELLOWS ASSEMBLY

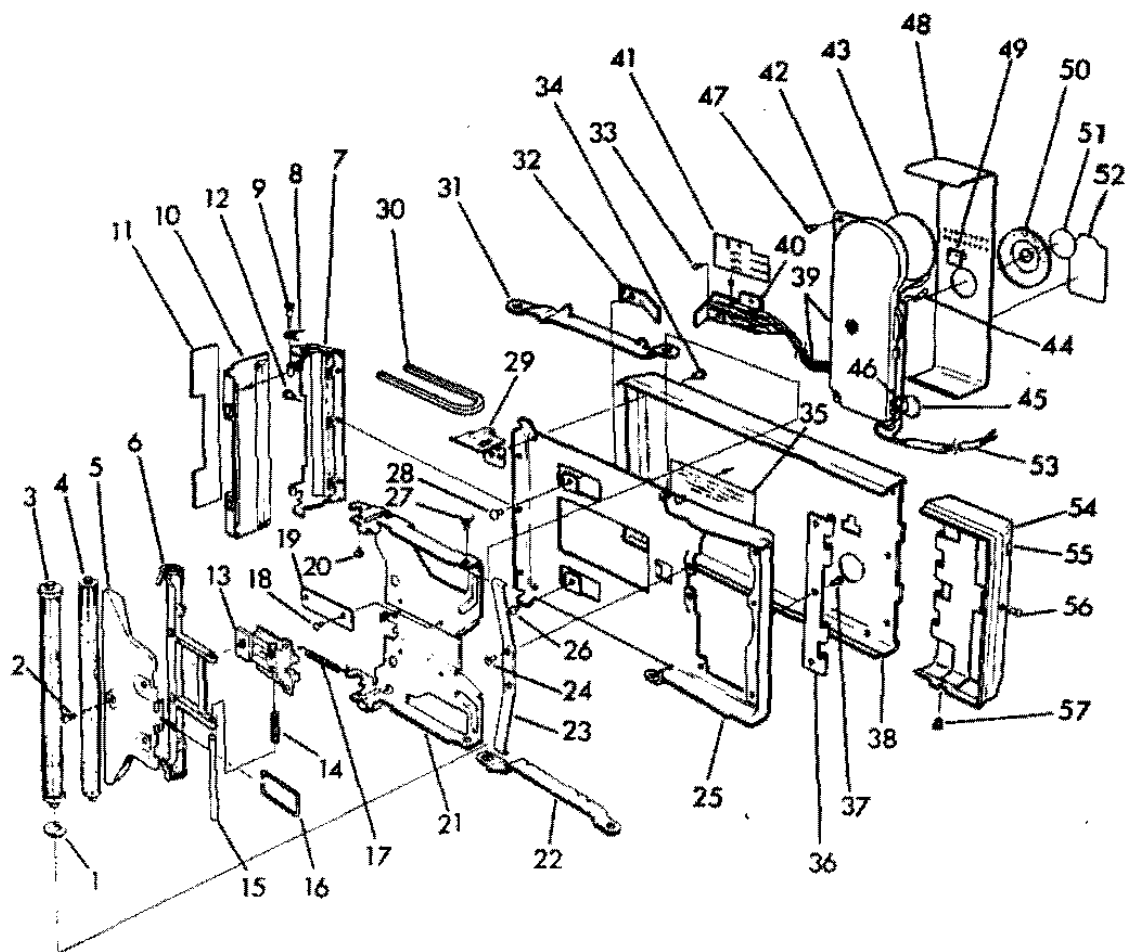
(SEE PLATE C FOR REMAINING PARTS)



* Screw #CR11336 may be used in place of rivet #149516 for customer repair purposes only.

PARTS LIST D

Key No.	Part Name	Part Number
	Body/Bellows Assembly-cont'd. (includes Key No's. 1 to 91 except those with asterisks)	223830
57	Focus Bar Assembly	223717
58	Focus Button (right)	196438
59	Rivet, Focus Button (2)	157860
60	Inner Frame (top)	149567
61	Zone Focus Plate	146684
62	Sleeve, Focus Bar (right)	154561
63	Washer, Focus Bar	154558
64	Focus Bar Bracket	154559
65	Rivet, Focus Bar Bracket (2)	82760
66	Rivet, Detent Slide	149516
67	Detent Slide	149566
68	Spring, Detent Slide	157869
69	Focus Bar Plate	157919
70	Sleeve, Focus Bar (left)	154563
71	Rivet, Pick-Up Bracket (2)	223095
72	Pick-Up Bracket	220183
73	Bushing, Focus Bar	155121
74	Focus Button (left)	196439
75	Bellows Light Seal	179732
76	Bellows Assembly	196378
77	Flash Wire Tab Assembly (2)	204010
78	Cable Release Wire Tab	204008
79	Inner Frame Bottom Assembly	154575
80	Track Guide	149550
81	Rivet, Track Guide	157876
82	Brake Rivet	154565
83	Brake Washer	154562
84	Brake Sleeve	154560
85	Brake Spring	155120
86	Rivet, Focus Bar (2)	154564
87	"U" Frame Assembly	149545
88	Link Pivot (2)	149581
89	Spacer, Link Pivot (2)	149552
90	Rivet, Shutter Mount Spring	162912
91	Bushing, Shutter Mount	157857

PLATE
E
REAR DOOR & REAR COVER ASSEMBLY

PARTS LIST E

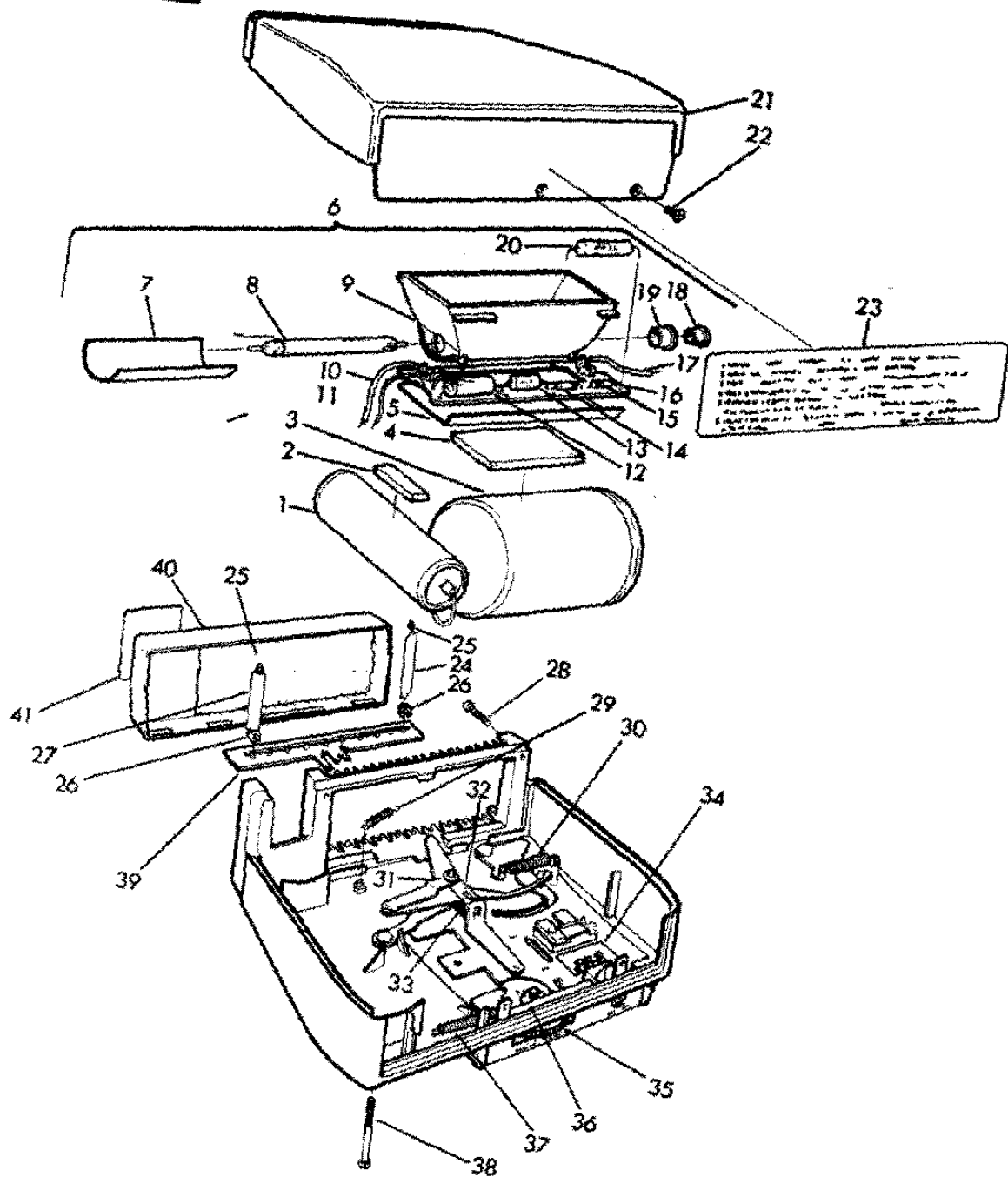
Key No.	Part Name	Part Number
	Rear Door Assembly	223719
1	Roll Bushing (4)	149517
2	Screw, Slide Block (3)	157837
3	Front Roll	149613
4	Rear Roll	149612
5	Slide Block Cover	163151
6	Edge Control Bar Assembly	163154

PARTS LIST E (cont'd.)

Key No.	Part Name	Part Number
7	Exit Cover Frame Assembly	250556
8	Pivot Spring, Exit Door	157894
9	Pivot Stud, Exit Door (2)	157895
10	Exit Door Assembly	157932
11	Exit Cover Plate	146678
12	Rivet, Exit Cover Frame (3)	121741
13	Slide Block Assembly	155330
14	Locating Spring, Edge Control (2)	149574
15	Shaft	157838
16	Link, Slide Block	157839
17	Spring, Slide Block	157841
18	Rivet, Slide Plate (4)	121741
19	Slide Plate (2)	157842
20	Latch Pin	160532
21	Frame Roller Support	149755
22	Front Roll Support (left)	155322
23	Door Spring	157904
24	Rivet, Door Spring (2)	121741
25	Spider, Rear Door	224271
26	Rivet, Roll Frame Spring (bottom)	121741
27	Pivot, Spread Roll (2)	157809
28	Rivet, Roll Frame Spring (top)	76121
29	Roll Latch	161121
30	Spring, Spread Roll (2)	155287
31	Front Roll Support (right)	155321
32	Spring, Roll Frame (2)	157992
33	Rivet, Spider	157830
34	Rivet, Rear Door	157896
35	Spider Decal	220329
36	Door Hinge	224462
37	Rivet, Door Hinge (3)	121741
38	Rear Door	223672
39	Electronic Timer & Switch Assembly	252449
40	Switch Sub-Assembly	252450
41	Insulator	251776
42	Electrical Timer Assembly	250436
43	Transducer Assembly	250347
44	Bulb	251616
45	Capacitor, Timer	255052
46	Sleeve, Capacitor	252780
47	Rivet, Electrical Timer (2)	250155
48	Electrical Nameplate	250309
49	Bulb Cover	250346
50	Potentiometer Driving Knob	224248
51	Index Plate	250716
52	Instruction Label	252938
53	Timer Wiring Tubing	224825
54	Rear Cover Assembly	223718
55	Indicator Window	222558
56	Rivet, Rear Cover (side)	157897
57	Rivet, Rear Cover	157830

PLATE
F

ELECTRONIC FLASH ASSEMBLY

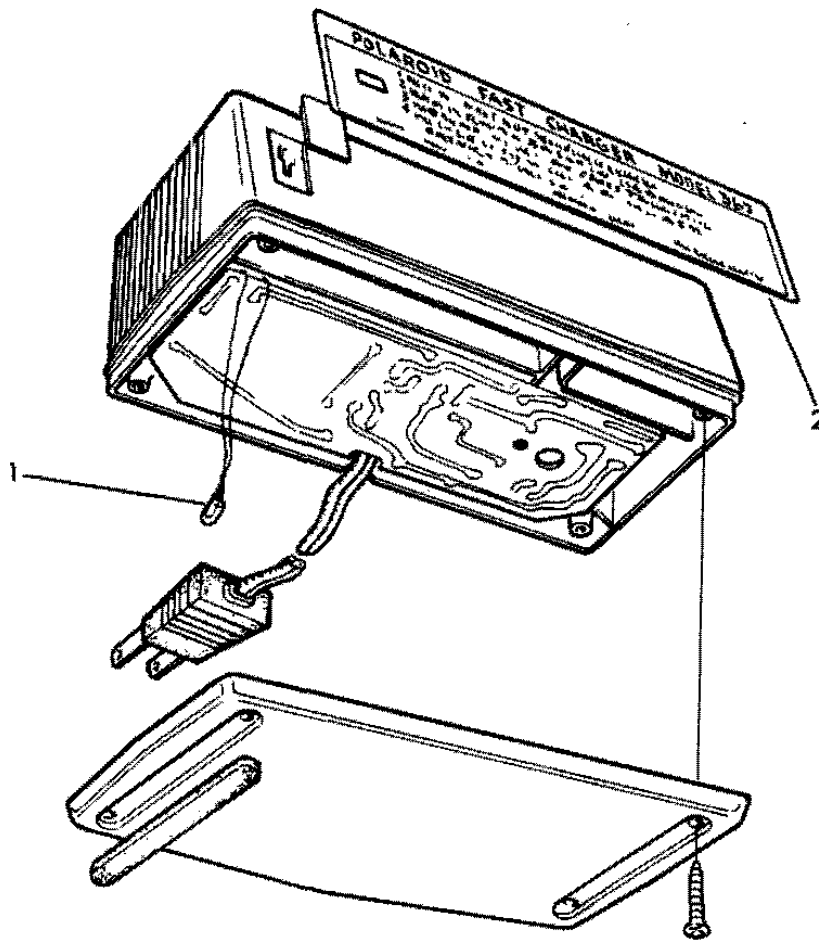


PARTS LIST F

Key No.	Part Name	Part Number
	Electronic Flash Assembly	223819
1	Battery Assembly	222019
2	Filler Pad	168177
3	Photo Flash Condenser Assembly	250735
4	Pad, Capacitor	251454
5	Insulator Paper	252512
6	Trigger Board Assembly	223714
7	Insert	224424
8	Flash Tube	222522
9	Reflector	223809
10	Wire (brown)	251606
11	Wire (white)	252590
12	Coil, Trigger	222523
13	Capacitor, Trigger	223937
14	Resistor	255051
15	Resistor	223935
16	Circuit Board	223614
17	Wire (orange)	251610
18	Grommet	270741
19		
20	Resistor	223936
21	Strobe Cover	252163
22	Screw, Cover (2)	224390
23	Instruction Plate Head	224426
24	Louver Assembly (left-hand) (5)	224428
25		
26		
27	Louver Assembly (right-hand) (5)	224431
28	Screw, Bezel (2)	224391
29	Spring, Actuating Bar	251685
30	Spring, Pick-Up Link	223098
31	Retaining Ring	224393
32	Spring, Pivot Stud	224503
33	Spring, Trim Link	223097
34	Insulator Paper	252513
35	Trim Wheel Assembly	252340
36	Nut, Zero Adjust	224330
37	Spring, Zero Adjust	222622
38	Screw, Strobe Body	252517
39	Bar, Louver Actuating	223650
40	Bezel Assembly	223715
41	Decal, Bezel	224509



FAST CHARGER ASSEMBLY



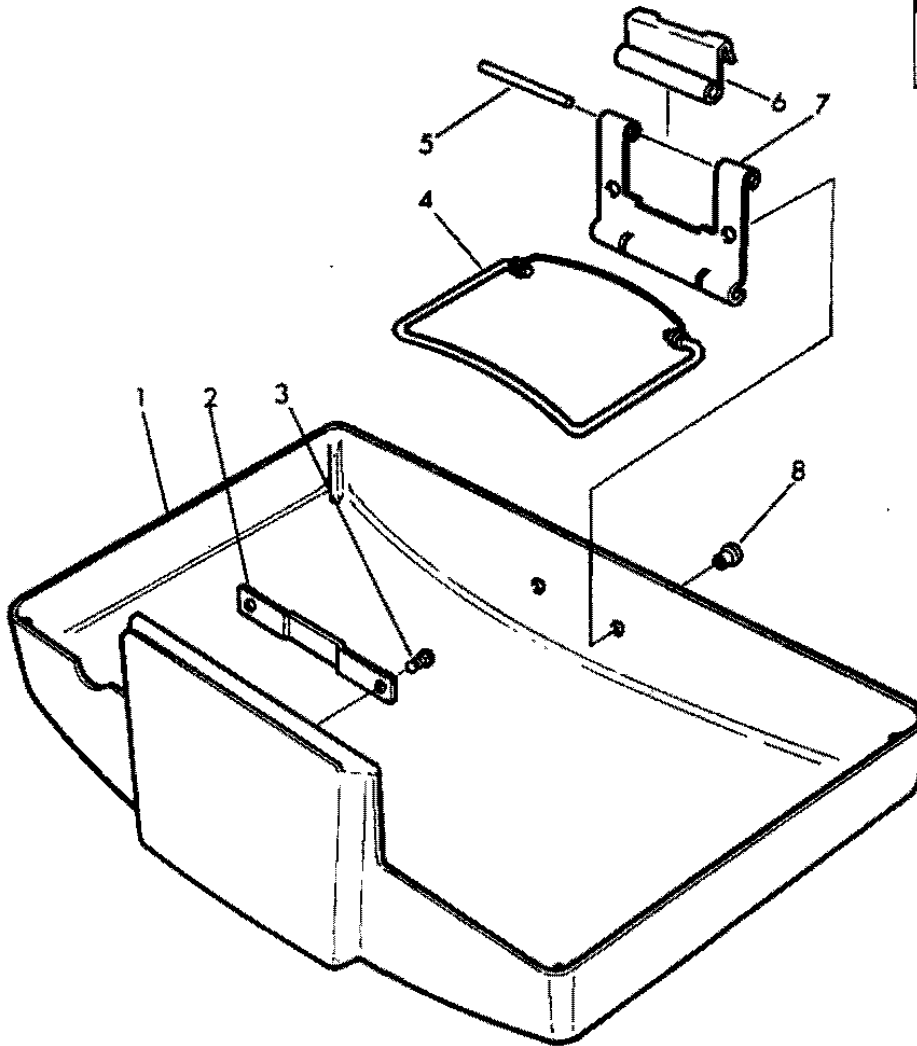
PARTS LIST G

Key No.	Part Name	Part Number
	Fast Charger Assembly	252170
1	Bulb	251813
2	Decal, Charger	252995

FRONT COVER ASSEMBLY

PLATE

H

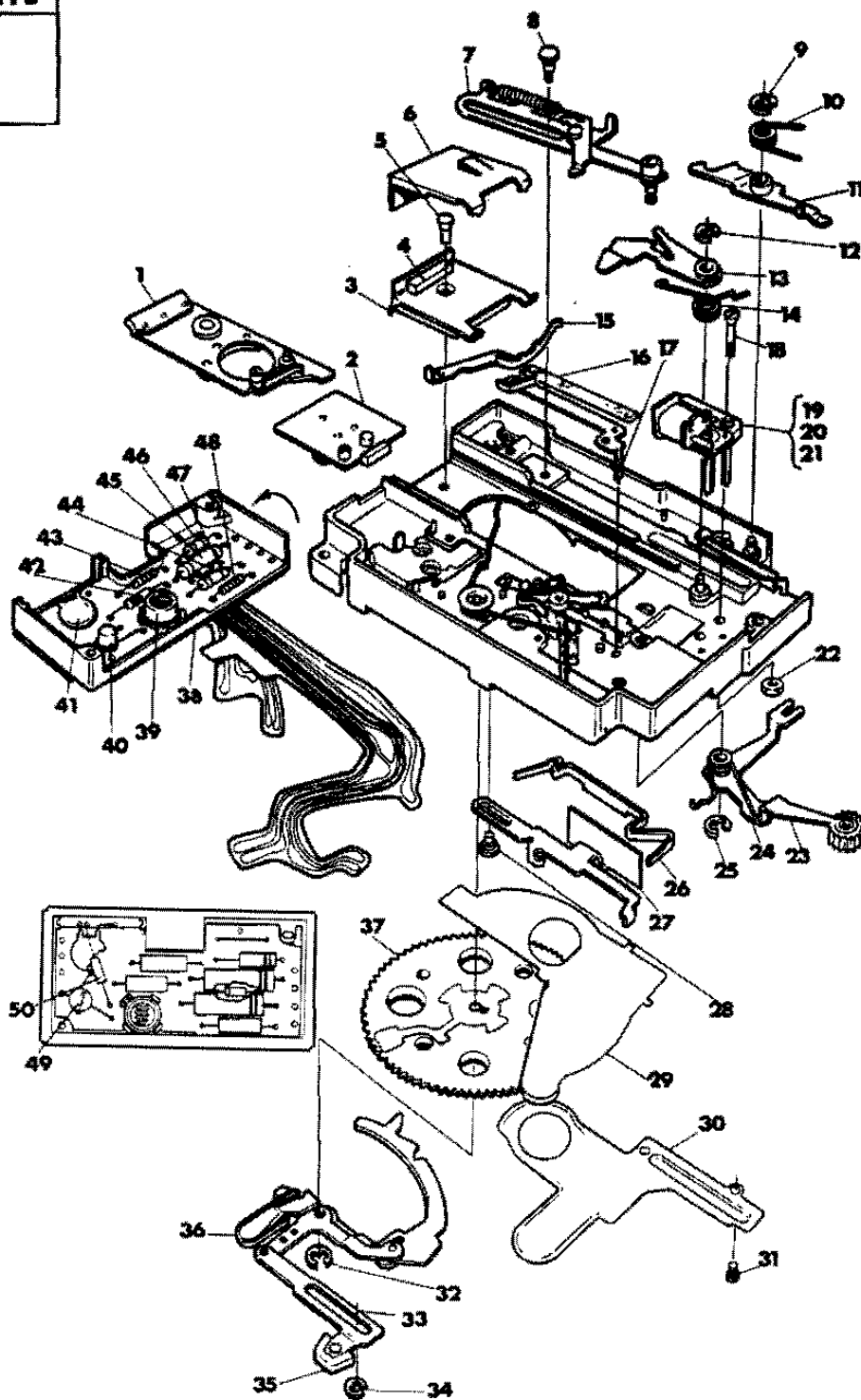


PARTS LIST H

Key No.	Part Name	Part Number
1	Front Cover Assembly	223611
2	Latch Plate	160439
3	Screw, Latch Plate (2)	160550
4	Clip Spring Assembly	160549
5	Mounting Plate Hinge Pin	160450
6	Mounting Clip Hinge	157933
7	Mounting Plate Hinge	157934
8	Rivet, Mtg. Plate Hinge (2)	160449

PLATE
1

MODEL 385 SHUTTER



PARTS LIST I

Key No.	Part No.	Part Name
—	223822	BASE BLOCK AND ELECTRONIC MOUNTING BLOCK ASSEMBLY
—	223825	BASE BLOCK ASSEMBLY (Includes key numbers 1 through 37).
1	252966	OPENING BLADE ASSEMBLY
2	146714	CLOSING BLADE ASSEMBLY
3	149782	CLOSING BLADE STOP BRACKET ASSEMBLY
4	155133	Shock Pad
5	149844	Rivet
6	155376	Stop Bracket Cap
7	161113	COCKING SLIDE ASSEMBLY
8	168169	Retaining Pin
9	155175	Retaining Ring
10	152501	Spring
11	149649	COCKING SLIDE LATCH ASSEMBLY
12	155175	Retaining Ring
13	149645	BLADE LATCH ASSEMBLY
14	152513	Spring
15	222915	X Contact
16	155292	X Connector Strip Insulator
17	250319	X Connector Strip
18	160545	Magnet Screw
19	149640	MAGNET ASSEMBLY
20	149846	Magnet
21	152509	MAGNET BOBBIN ASSEMBLY
22	160546	Magnet Nut
23	220332	COCKING ARM ASSEMBLY
24	149864	Cocking Arm Spring
25	155161	Retaining Ring
26	157928	Indicator Spring
27	195916	Readout Indicator
28	153259	Indicator Pin
29	155382	Rear Light Baffle
30	146862	Front Light Baffle
31	160464	Front Light Baffle Screw
32	155160	Retaining Ring
33	178472	READOUT ACTUATOR ASSEMBLY
34	155161	Retaining Ring
35	196248	Scene Selector Slider Button
36	154062	Aperture Detent
37	223716	APERTURE WHEEL ASSEMBLY
38	223826	ELECTRONIC MOUNTING BLOCK ASSEMBLY
39	155249	Photocell
40	251452	Integrated Circuit
41	255050	Capacitor (C5)
42	250107 or 250169	Resistor (R9)
43	250104 or 250168	Resistor (R2)
44	252518	Closing Diode
45	250167	Capacitor (C3)
46	250108	Capacitor (C1)
47	250109	Capacitor (C2)
48	250103 or 250191	Resistor (R1)
49	271993	Insulator
50	271992	Resistor (R13)

NUMERICAL PARTS / PRICE LIST

Part No.	Part Name	Suggested List Price
76121	Rivet, Spring Stop (2)	.04
76175	Rivet, Light Seal (4)	.04
82760	Rivet, Focus Bracket	.04
103191	Rivet, Handguard Latch (2)	.04
121741	Rivet	.04
130501	Banding Clip	.04
146674	Release Latch	.39
146678	Exit Cover Plate	.22
146684	Zone Focus Plate	.09
146689	Shutter Release Knob	.44
146714	CLOSING BLADE ASSEMBLY	1.23
146722	Shutter Release Block	.09
146750	Right Hand Guard	.18
146862	Front Light Baffle	.09
149516	Rivet, Detent Slide	.04
149517	Roll Bushing (4)	.04
149520	Spring Stop	.04
149526	Hinge Pin, Rear Door	.04
149528	Spring, R. F. Body	.04
149538	Screw, Shutter Mount	.04
149542	Hinge Pin (right)	.04
149543	Hinge Pin (left)	.04
149545	"U" FRAME ASSEMBLY	.79
149550	Track Guide	.04
149551	Return Spring	.04
149552	Spacer, Link Pivot (2)	.04
149553	Pivot Pin, Outer Frame (bottom)	.04
149554	Spacer, Outer Frame (top)	.04
149556	Slot Cover	.13
149566	Detent Slide	.04
149567	Inner Frame (top)	.31
149570	Screw, Shutter Shaft	.09
149574	Locating Spring, Edge Control (2)	.04
149581	Link Pivot (2)	.09
149610	Release Arm	.18
149612	Rear Roll	1.00
149613	Front Roll	1.36
149640	MAGNET ASSEMBLY	1.18
149645	BLADE LATCH ASSEMBLY	.13
149649	COCKING SLIDE LATCH ASSEMBLY	.13
149710	R.F. - V.F. Pivot Pad (2)	.09
149740	Cable Release Cover	.13
149755	Frame Roller Support	.61
149782	CLOSING BLADE STOP BRACKET ASSEMBLY	.26
149809	Center Ring	.13
149810	Outer Ring	.39

NUMERICAL PARTS / PRICE LIST

Part No.	Part Name	Suggested List Price
149813	Bezel Spring	.13
149817	Screw, Module Mounting (2)	.04
149821	Dowel Pin (2)	.04
149822	Screw, Shutter Fastg. (long)	.04
149828	Screw Shutter Fastg. (short)	.04
149838	Rivet, Cell Wedge (2)	.04
149844	Rivet, Shutter	.04
149846	Magnet	.52
149864	Cocking Arm Spring	.09
149865	Screw, Base Block Mtg. (long)	.04
152501	Spring	.04
152509	MAGNET BOBBIN ASSEMBLY	
152513	Spring	.04
152521	Release Block Retainer	.04
152525	Bezel Friction Spring	.04
153234	Bezel Shutter Release	.18
153235	Spacer, Outer Frame (bottom)	.04
153259	Indicator Pin	.04
154046	"C" Lens Retainer	.09
154062	Aperture Detent	
154071	Cell Lens	.13
154558	Washer, Focus Bar	.04
154559	Focus Bar Bracket	.04
154560	Brake Sleeve	.04
154561	Sleeve, Focus Bar (right)	.04
154562	Brake Washer	.04
154563	Sleeve, Focus Bar (left)	.04
154564	Rivet, Focus Bar (2)	.04
154565	Brake Rivet	.09
154575	INNER FRAME BOTTOM ASSEMBLY	.31
154856	Cell Lens Mount	.09
154857	Cell Lens Retainer	.22
154870	Screw Release Cover (2)	.04
155106	Shutter Release Tip	.04
155117	SHUTTER RELEASE BUSHING ASSEMBLY	.31
155120	Brake Spring	.09
155121	Bushing, Focus Bar	.04
155133	Shock Pad	.04
155160	Retaining Ring	.04
155161	Retaining Ring	.04
155175	Retaining Ring	.04
155179	Wave Washer	.04
155235	FRONT LENS MOUNT ASSEMBLY	6.83
155242	Lens Rear Positive	2.18
155249	Photocell	2.19
155287	Spring Spread Roll (2) (left)	.22
155292	X Connector Strip Insulator	.04

NUMERICAL PARTS / PRICE LIST

Part No.	Part Name	Suggested List Price
155321	Front Roll Support (right)	.13
155322	Front Roll Support	.13
155330	SIDE BLOCK ASSEMBLY	.26
155331	Shutter Gasket	.09
155376	Stop Bracket Cap	.04
155382	Rear Light Baffle	
157804	Strap Lug (2)	.22
157809	Pivot Spread Roll	.04
157821	Keeper	.04
157824	Tension Slide	.04
157830	Rivet	.04
157837	Screw, Slide Block (3)	.04
157838	Shaft	.04
157839	Link Side Block	.04
157841	Spring Side Block	.09
157842	Side Plate (2)	.09
157857	Bushing, Shutter Mount	.04
157860	Rivet, Focus Button (2)	.04
157866	Screw, Base Block Mtg. (short)	.04
157869	Spring, Detent Slide	.04
157876	Rivet, Track Guide	.04
157877	Rivet, Spring Contact	.04
157887	Hinge Plug (2)	.04
157894	Pivot Spring, Exit Door	.04
157895	Pivot Stud, Exit Door	.04
157896	Rivet Rear Door	.04
157897	Rivet Rear Cover (side)	.04
157899	Latch Pivot	.04
157904	Door Spring	.04
157915	Filler (left)	.04
157916	Filler (right)	.04
157919	Focus Bar Plate	.04
157923	Mounting Plate Spring	.31
157928	Indicator Spring	.18
157932	EXIT DOOR ASSEMBLY	.70
157933	Mounting Clip Hinge	.22
157934	Mounting Clip Hinge	.22
157939	Electric Mounting Board Insulator	.04
157949	Detent	.04
157992	Spring, Roll Frame (2)	.04
160416	Spring, Release Latch	.04
160439	Latch Plate	.04
160442	Bowed Washer	.04
160449	CLIP SPRING ASSEMBLY	.04
160450	Mounting Plate Hinge Pin	.04
160455	"D" Ring (2)	.04
160464	Front Light Baffle Spring	.04

NUMERICAL PARTS / PRICE LIST

Part No.	Part Name	Suggested List Price	
160465	Screw Tab Strip Bar (2)	.04	-
160473	Detent Stud	.04	-
160532	Latch Pin	.04	-
160545	Magnet Screw	.04	-
160546	Magnet Nut	.06	-
160550	Screw Latch Plate (2)	.04	-
160573	Band	.04	-
161113	COCKING SLIDE ASSEMBLY	.83	-
161121	Roll Latch	.26	-
162912	Rivet Shutter Mount Spring	.04	-
163016	NECK STRAP ASSEMBLY	1.88	-
163081	Battery (2)	1.25	-
163085	Tab Strip Bar	.26	-
163151	Slide Block Cover	.31	-
163154	EDGE CONTROL BAR ASSEMBLY	.79	-
163301	Front Casting Light Seal	.04	-
168098	Shutter Shaft	.35	-
168099	Shutter Shaft Sleeve	.22	-
168169	Retaining Pin	.04	-
168177	Filler Pad	.04	-
172320	Spring Shutter Mount	.13	-
178472	READOUT ACTUATOR ASSEMBLY	.85	-
179731	Bellows Front Frame Light Seal	.09	-
179732	Bellows Light Seal	.09	-
181540	RANGEFINDER - VIEWFINDER ASSEMBLY	23.28	-
185640	Magnet Pivot (eccentric)	.35	-
188089	Pole Piece (2)	.09	-
188090	Magnet	.13	-
195194	Magnet Spring	.04	-
195916	Readout Indicator		-
196248	Scene Selector Slider Button		-
196378	BELLOWS ASSEMBLY	3.89	-
196438	Focus Button (right)	.22	-
196439	Focus Button (left)	.13	-
204008	Cable Release Wire Tab	.04	-
204010	FLASH WIRE TAB ASSEMBLY (2)	.04	-
204408	BEZEL ASSEMBLY	1.31	-
220179	Foot Body	.44	-
220183	Pick-up Bracket	.09	-
220332	COCKING ARM ASSEMBLY	.45	-
220329	Spider Decal	.09	-
220796	Cell Wedge	.13	-
220968	Screw, Bellows (4)	.04	-
222019	BATTERY ASSEMBLY	8.25	-
222448	BATTERY WIRE ASSEMBLY	.56	-
222522	Flash Tube	3.24	-
222523	Coil, Trigger	1.18	-
222549	Stationary Hinge	.48	-
222558	Indicator Window	.09	-
222622	Spring, Zero Adjust	.04	-
222915	X Contact	.25	-

NUMERICAL PARTS / PRICE LIST

Part No.	Part Name	Suggested List Price
222953	CONVERTER CIRCUIT BOARD ASSEMBLY	29.18
223095	Rivet Pick-up Bracket (2)	.04
223097	Spring, Trim Link	.04
223098	Spring Pick-up Link	.09
223611	FRONT COVER ASSEMBLY	2.36
223614	Circuit Board	.39
223650	Bar, Louver Actuating	.09
223672	Rear Door	1.44
223714	TRIGGER BOARD ASSEMBLY	10.41
223715	BEZEL ASSEMBLY	.92
223716	APERTURE WHEEL ASSEMBLY	.75
223717	FOCUS BAR ASSEMBLY	2.41
223718	REAR COVER ASSEMBLY	2.10
223719	REAR DOOR ASSEMBLY	34.03
223809	Reflector	.61
223819	STROBE HEAD ASSEMBLY	44.95
223822	BASE BLOCK & ELECTRONIC MTG. BLOCK ASSY.	33.11
223823	SHUTTER FRONT CASTING ASSEMBLY	14.79
223824	SHUTTER REAR CASTING ASSY.	8.05
223825	BASE BLOCK ASSEMBLY	
223826	ELECTRONIC MOUNTING BLOCK ASSEMBLY	17.50
223830	BODY/BELLOWS ASSEMBLY	23.41
223832	FOOT ASSEMBLY	2.75
223905	Screw, Mounting (2) (Slot Head)	.04
223907	LIGHT SEAL ASSEMBLY	1.71
223935	Resistor	.61
223936	Resistor	.09
223937	Capacitor, Trigger	.31
224248	Potentiometer Driving Knob	.35
224271	Spider, Rear Door	.92
224330	Nut, Zero Adjust	.04
224390	Screw, Cover (2)	.04
224391	Screw Bezel (2)	.04
224393	Retaining Ring	.04
224424	Insert	.18
224426	Instruction Plate Head	.13
224428	LOUVER ASSEMBLY (LEFT-HAND) (5)	.18
224431	LOUVER ASSEMBLY	.18
224434	Screw, Foot (2) - Rear	.04
224462	Door Hinge	.35
224503	Spring Pivot Stud	.04
224508	Battery Pad	.04
224509	Decal Bezel	.13
224825	Timing Wiring Tubing	.04
250103	Resistor R1	.13
250104	Resistor R2	.13
250107	Resistor R9	.13
250108	Capacitor C1	.65
250109	Capacitor C2	.65

NUMERICAL PARTS / PRICE LIST

Part No.	Part Name	Suggested List Price	
250155	Rivet Electrical Timer (2)	.04	-
250167	Capacitor C3	.65	-
250168	Resistor R2 (Alternate)	.13	-
250169	Resistor R9 (Alternate)	.13	-
250173	Screw, Foot (2) - Front	.04	-
250174	Screw, Battery Compartment	.04	-
250182	Screw, Mounting (Phillips Head)	.04	-
250183	Washer (3)	.04	-
250191	Resistor R1 (Alternate)	.13	-
250309	Electrical Nameplate	.57	-
250319	X Connector Strip	.25	-
250346	BULB COVER ASSEMBLY	.09	-
250347	TRANSDUCER ASSEMBLY	.92	-
250436	ELECTRICAL TIMER ASSEMBLY	17.76	-
250552	Top Etch Plate	.22	-
250556	EXIT COVER FRAME ASSEMBLY	2.10	-
250716	Index Plate	.09	-
250729	Front Decorative Plate	.31	-
250735	PHOTO FLASH CONDENSOR ASSEMBLY	13.50	-
251330	BATTERY COMPARTMENT ASSEMBLY	3.02	-
251452	Integrated Circuit	3.85	-
251454	Pad, Capacitor	.04	-
251606	Wire (Brown)	.13	-
251610	Wire (Orange)	.13	-
251616	Bulb	.92	-
251685	Spring Actuating Bar	.04	-
251698	Spacer, Foot Screw (2)	.04	-
251776	Insulator	.04	-
251813	Bulb	.92	-
252163	Strobe Cover	.66	-
252164	Left-Hand Guard	.53	-
252165	Battery Compartment	.66	-
252170	FAST CHARGER ASSEMBLY	19.95	-
252340	TRIM WHEEL ASSEMBLY	.48	-
252403	Shutter Mount	.70	-
252449	ELECTRONIC TIMER & SWITCH ASSEMBLY	18.11	-
252450	SWITCH SUB-ASSEMBLY	.35	-
252463	BATTERY CRADLE ASSEMBLY	1.75	-
252512	Insulator Paper	.04	-
252513	Insulator Paper	.04	-
252517	Screw, Strobe Body	.04	-
252518	Closing Diode	.18	-
252590	Wire (White)	.04	-
252780	Sleeve Capacitor	.04	-
252938	Instruction Label	.04	-
252961	Insulator Paper	.04	-
252962	Handguard Latch	.04	-
252966	OPENING BLADE ASSEMBLY	.95	-
252995	Decal, Charger	.35	-
255050	Capacitor, C5	.65	-
255051	Resistor	.09	-

NUMERICAL PARTS / PRICE LIST

Part No.	Part Name	Suggested List Price
255052	Capacitor, Timer	.26
255105	BATTERY INTERLOCK ASSEMBLY	.39
270741	Grommet	.09
271992	Resistor, R13	.13
271993	Insulator	.04

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1